

1/14/05 - 00372

Final Technical Memorandum

Site 2 Outfall Sediment Investigation Results and Development of Reference Sediment Data in St. Juliens Creek

St. Juliens Creek Annex
Chesapeake, Virginia



Prepared for
Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic

Contract No. N62470-02-D-3052
CTO-0024

January 2005

Prepared by
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St. Juliens Creek Annex, Chesapeake, Virginia

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January 14, 2005

Introduction

This memorandum summarizes the sediment investigation performed as part of the Site 2 Expanded Remedial Investigation (ERI) at St. Juliens Creek Annex (SJCA), Chesapeake, Virginia. The purpose of the ERI for Site 2 was to fill data gaps identified in the *Final Remedial Investigation/Human Health Risk Assessment/Ecological Risk Assessment (RI/HHRA/ERA) Report for Site 2* (CH2M HILL, 2004). The objective of the sediment investigation was to establish reference sample locations in St. Juliens Creek, upstream from Site 2 to evaluate the potential impacts from the Site 2 inlet to St. Juliens Creek.

This tech memo presents a current site description and history, the ERI field activities, a summary of all existing sediment data collected at Site 2 and in St. Juliens Creek, statistical analysis of the reference data, analytical results of the Site 2 data, conceptual model, and conclusions and recommendations for a path forward.

The information in this technical memorandum will be incorporated into the addendum to the RI/HHRA/ERA for Site 2, following additional groundwater delineation tentatively scheduled for fall 2004.

Site History and Description

The SJCA facility is situated at the confluence of St. Juliens Creek and the Southern Branch of the Elizabeth River in the City of Chesapeake, located in southeastern Virginia (Figure 1).

Site 2 is an unlined waste disposal area located at the corner of St. Juliens Drive and Cradock Street in the southern portion of the facility (Figure 2). It is estimated that Site 2

covers approximately 1.5 acres. Operations at Site 2 began in 1921 and continued until sometime after 1947. Initially, refuse was burned openly onsite and was used to fill in the adjacent inlet. In 1942, an incinerator was installed and replaced the open burning practices. Garbage, acids, waste ordnance, and abrasive blast media (ABM) were reportedly disposed of at Site 2. The total volume of waste prior to burning is reported to have been approximately 35,185 cubic yards.

In the center of Site 2 is a water body surrounded by brush, trees, and grass that is directly connected to St. Juliens Creek. This inlet is tidally influenced and drains surface water from adjoining land into the creek. The Site 2 topography is generally level, sloping towards the inlet and St. Juliens Creek. Groundwater flow mimics the topography and flows towards the inlet and creek. Construction debris (concrete and brick), as well as ABM, is visible at the site. Two to three feet (ft) deep grassed drainage ditches are located along Cradock Street. An underground storm drainage system also originates approximately 1,000 ft northeast of the Site 2 area and outlets to the northernmost culvert to the inlet. Surface runoff from an adjacent parking lot to the northwest of the inlet drains directly into the inlet.

Field Investigation Activities

The ERI field investigation was conducted on January 6, 2004 in accordance with the *Final Work Plan for the Expanded Remedial Investigation Work Plan at Sites 2 and 5* (CH2M HILL, 2003). Sediment samples were collected from 11 locations within St. Juliens Creek, upstream of Site 2, and just outside of the Site 2 inlet to determine if there is significant communication between the inlet and St. Juliens Creek. Two transects of four samples each (including a sediment sample collected previously during the RI/HHRA/ERA) were collected at the confluence of the Site 2 inlet and St. Juliens Creek as inlet outfall samples. Five samples were collected upstream of Site 2 in St. Juliens Creek as reference sample locations. The sample locations are shown on Figure 3.

The reference sample locations were based on field identification by a field biologist based on the likeness of physical properties (apparent sediment grain size and organic content) as compared to inlet outfall sediment.

The sediment samples were collected from 0 to 6 inches below sediment surface with a stainless steel hand auger. Water quality parameters (pH, temperature, conductivity, salinity, dissolved oxygen, turbidity, and oxidation reduction potential [ORP]) of the overlying surface water were collected and are included on Table 1. The sediment samples were submitted to an offsite laboratory (Mitkem) and analyzed for Target Compound List (TCL) semivolatile organic compounds (SVOCs), TCL pesticides/ polychlorinated biphenyls (PCBs), Target Analyte List (TAL) inorganics, total organic carbon (TOC), and grain size based on the risk drivers identified in the RI/HHRA/ERA for Site 2. Quality assurance/quality control (QA/QC) samples were collected to ensure credibility of the analytical results, and included field blanks, equipment blanks, trip blanks, duplicates, matrix spike/matrix spike duplicates (MS/MSD) samples, and laboratory blanks. The complete analytical results are included in Appendix A.

Hard copies and electronic versions of the analytical data report were submitted to Environmental Data Quality, Inc. for third-party validation. Validation procedures

established by the Region III Modification to the National Functional Guidelines for Organic (EPA, 1994) and Inorganic Analyses (EPA, 1993) were adhered to during the validation process.

Data Summary

The following subsections describe the existing sediment data that has been collected at Site 2 and in St. Juliens Creek.

Inlet Sediment Data

Fourteen sediment samples (SJS02-SD01 through SD14) were collected from the Site 2 inlet (Figure 3) during the RI/HHRA/ERA. The field activities were conducted in three phases; the first and second phases were conducted from June to November 1997 and from April to October 1999, respectively and the third phase was conducted from June to August 2001. The sediment samples were collected from 0 to 6 inches below sediment surface. SJS02-SD01 through SD09 were analyzed for TCL VOCs, TCL SVOCs, TCL pesticides/PCBs, TAL inorganics, nitramines, phosphorus, TOC, and grain size; and SJS02-SD10 through SD14 were analyzed for dioxins (Appendix A).

Outfall Transect Data

Six samples (SJS02-SD15 through SD20) were collected at the confluence of the Site 2 inlet and St. Juliens Creek during the ERI in January 2004. One sample (SJS02-SD08) was collected during the RI (Figure 3). The outfall sediment samples were collected from 0 to 6 inches below sediment surface and analyzed for TCL SVOCs, TCL pesticides/PCBs, TAL inorganics, TOC, and grain size (Appendix A).

Background Data

Seven background sediment samples were collected in St. Juliens Creek in April and October 1999 (Figure 3). Four of the sediment samples (SJSBK-SD03through SD06) were collected upstream of Site 2. Two samples (SJSBK-SD01 and SD12) were collected downstream of Site 2 and one sample (SJSBK-SD02) was located adjacent to Site 2. The background sediment samples were collected from 0 to 6 inches below sediment surface and analyzed for TCL VOCs, TCL SVOCs, TCL pesticides/PCBs, TAL inorganics, TOC, and percent solids (Appendix A).

Reference Data

Five reference (SJREF-SD01 through SD05) sediment samples were collected in St. Juliens Creek during the ERI in January 2004 (Figure 3). The reference sediment samples were collected from 0 to 6 inches below sediment surface and analyzed for analyzed for TCL SVOCs, TCL pesticides/PCBs, TAL inorganics, TOC, and grain size (Appendix A).

St. Juliens Creek Hazard Ranking System Data

In 1999, a Hazard Ranking System (HRS) plan was developed to evaluate SJCA (Tetra Tech, 1999). Potential sources, including Site 2, that may have released contaminants were identified. Five sediment samples (SD9 and SD11 through SD14) were collected in St. Juliens Creek in February 1999 and analyzed for TAL and TCL constituents (Figure 3).

Several of the sediment samples collected in St. Juliens Creek were adjacent to Site 2. The relevant data are presented in Tables 2 and 3 from the HRS (Tetra Tech, 2000). In the samples collected adjacent to Site 2, organic and inorganic concentrations met the HRS criteria for observed releases and the presence of contaminants in St. Juliens Creek were partially attributable to Site 2.

Data Evaluation

Statistical Analysis

The reference sample areas were chosen as representative of anthropogenic conditions based on their isolation from site-related sources of contamination as compared to the inlet outfall location. The reference locations are primarily adjacent to residential areas as identified from aerial photographs and were selected in upstream/isolated areas believed to receive a reduced degree of point and non-point source inputs. These reference areas are expected to receive different non-site related contributions (e.g., urban and residential runoff) than sample locations immediately adjacent to the inlet outfall, with chemical concentrations levels reflective of typical urban watershed environments.

With the exception of the background sample location SJSBK-SDS02, the background sediment samples were collected in similar conditions as the reference sediment samples. The TOC and grain size data (Appendix A) from the reference and background sediment were evaluated and determined to be comparable to the inlet and outfall sediment. Therefore, the background data were combined with the reference data to generate reference upper tolerance limits (UTLs) for St. Juliens Creek sediment and will be referred to collectively as reference data from this point forward. SJSBK-SD02 was excluded from the data set based on the proximity to Site 2, elevated constituent concentrations, and location in a potentially depositional environment. From this point forward, SJSBK-SD02 will be incorporated with the Site 2 sediment data.

Complete data tables, provided in Appendix A, list analytical results for all constituents analyzed in the reference sediment samples.

Distribution

Making an appropriate distributional assumption for the data is an important prerequisite for statistical analyses. A distributional assumption is the best estimate of the distribution of the parent (or target) population. The key determination of the data distribution was based on the results of the Shapiro-Wilk test (see Gilbert, 1987 or EPA, 2000 for methodology and examples).

A significance level of 0.05 was used for these tests. If the p-value for the Shapiro-Wilk test was greater than or equal to 0.05, the distributional assumption was chosen to be normal. If the number of samples was too small for the test or if the p-value was below 0.05, then the data was treated nonparametrically. Distributional assumptions for detected constituents and p-values are shown on Table 4.

Calculation of Reference Upper Tolerance Limits (UTLs)

A 95 confidence/95 coverage background UTL is an upper bound (with 95% confidence) of the background 95th percentile. The calculation of the UTLs depends on the distributional assumption. When appropriate, the normal UTL was calculated using the following equation:

$$UTL = \bar{x} + (K \times s),$$

where \bar{x} is the sample mean;

K is the tolerance factor; and

s is the sample standard deviation.

For data sets that were not normally distributed, nonparametric UTLs were calculated. A nonparametric UTL is computed by first ranking the concentrations and then choosing the lowest ranked detected concentration that provides a coverage of 95% with 95% confidence. For data sets with less than 59 concentrations ($n < 59$), 95% coverage is not possible with 95% confidence, even when the maximum concentration is assigned as the UTL. This was the case for the data in this study, so the estimated percentile (95th or lower) associated with the maximum concentration (assuming the magnitude of the maximum concentration appears defensible) was reported. This percentile is calculated using the following equation:

$$p = B_{0.95,n,1}$$

where B is a beta distribution defined by n (the number of sample results) and 1 (since the highest ranked concentration is being used). Calculated percentiles and reference UTLs are shown on Table 4. The complete data set of statistical plots are included in Appendix B.

Outliers

Outlier analysis was performed for each parameter's sediment data. Per EPA guidance (EPA, 2000), and the available sample size (less than 25 samples in each case) Dixon's Extreme Value test was used. If sample sizes of 25 or more were available, Rosner's test would have been applied. The outlier tests were applied to the highest five concentrations for each parameter. While Rosner's handles potential multiple outliers directly, the Extreme Value does not, but it was nevertheless applied sequentially for each elevated value. These outlier tests were performed with a significance level of 0.05.

These outlier tests are based on an assumption that the remaining concentrations represent a normal distribution (after the potential outlier is excluded). This assumption was typically not true, based on the Shapiro-Wilk test using a significance level of 0.05. Since the tests of normality for the non-outlier concentrations did not typically support assumptions of normality, the data were transformed as suggested by guidance (EPA, 2000). Three different transformations were conducted for each potential outlier; these were the square root transformation, the cubic root transformation, and the natural logarithmic transformation. The logarithmic transformation is a standard transformation in environmental applications, while the square root and cubic root offer options appropriate for intermediate levels of skewness in the data.

The transformation offering the greatest p-value for normality was chosen for each individual case. Using data thus transformed, the Dixon's Extreme Value test was

performed to determine which elevated concentrations should be excluded from the background data set. These exclusions are presented in Table 5. Also, on the plots (Appendix B) these excluded concentrations are indicated by an "X" symbol. For some volatiles, these include some proxy concentrations for non-detected results. While these non-detect proxies would not be eligible to serve as nonparametric UTLs, they would be included in any potential central tendency comparisons between background and site concentrations. These central tendency comparisons would probably either be two-sample t tests (when both the background and site concentrations appear to be normally distributed) or the nonparametric Wilcoxon Rank Sum tests in all other cases. All of the concentrations identified as outliers listed in Table 5 should be excluded from such calculations.

Identification and removal of these elevated concentrations was performed to help ensure that the established reference data set was suitably conservative to characterize background conditions.

Summary of Analytical Results

Complete data tables, provided in Appendix A, list analytical results for all constituents analyzed in the sediment samples. Table 6 shows constituents that were detected in one or more samples compared to the reference UTLs and risk-based screening values. A shaded cell indicates that the parameter exceeds the reference UTL. An outlined cell indicates that the parameter exceeds the Biological Technical Assistance Group (BTAG) sediment screening values. Bold text indicates the parameter exceeds the adjusted residential soil RBC (adjusted x10 for sediment). Potential risk drivers in sediment identified in the baseline HHRA and screening ERA and Step 3 of the ERA process (CH2M HILL, 2004a) are also indicated on Table 6. The distribution of constituents exceeding the reference UTLs are shown on Figure 4.

The inorganic constituents calcium, magnesium, potassium, phosphorous, and sodium are not typical in waste streams characteristic of the activities conducted at Site 2. These common inorganic constituents are essential nutrients, are not considered potential site-related compounds, do not pose human health or ecological risks, and therefore do not warrant detailed attention or discussion.

Semivolatile Organic Compounds. Eighteen SVOCs were detected in Site 2 sediment samples. Five of the SVOCs detected [benzo(a)pyrene, benzo(g,h,i)perylene, chrysene, phenanthrene, and pyrene] were identified as potential ecological risk drivers in the RI/HHRA/ERA. These SVOCs were present at concentrations exceeding reference UTLs at inlet sediment location SJS02-SD05 and/or outfall sediment location SJS02-SD20.

Bis(2-ethylhexyl)phthalate was detected at concentrations that exceeded the reference UTLs at inlet sediment location SJS02-SD09 and outfall transect sediment locations SJS02-SD15, SD16, and SD18. Indeno(1,2,3-cd)pyrene was also detected above the reference UTL at outfall sediment location SJS02-SD20.

No SVOCs were identified as human health risk drivers in the RI/HHRA/ERA and were not present at concentrations exceeding the adjusted residential soil RBCs in either inlet or outfall sediment.

Pesticides and Polychlorinated Biphenyls. Eight pesticides/PCBs were detected in Site 2 sediment samples. 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT were detected above the reference UTLs in both the inlet and outfall sediment locations but were not identified as potential ecological risk drivers in the RI/HHRA/ERA.

No reference UTLs were established for the potential ecological risk drivers (aroclor-1260, alpha-chlordane, and gamma-chlordane) identified in the RI/HHRA/ERA because these constituents were not detected in the reference data set. Aroclor-1260, alpha-chlordane, and gamma-chlordane were detected above the BTAG screening values within the inlet and at the inlet outfall (SJS02-SD08 and SD20) only.

No pesticides/PCBs were identified as human health risk drivers in the RI/HHRA/ERA and were not present at concentrations exceeding the adjusted residential soil RBCs.

Inorganics. All 24 TAL inorganics were detected in the Site 2 sediment. Eight of the inorganics detected (arsenic, barium, cadmium, chromium, copper, cyanide, lead, and zinc) were identified as potential ecological risk drivers in the RI/HHRA/ERA. Concentrations of barium, cadmium, chromium, copper, cyanide, lead, and zinc also exceeded the reference UTLs in both the inlet and outfall transect sediment and the highest concentrations occurred in the inlet sediment. The outfall transect sediment samples contained significantly lower inorganic concentrations with the highest concentrations occurring at the outfall locations (SJS02-SD08 and SD20).

Non-risk driver exceedances of the reference UTLs included aluminum, antimony, cobalt, iron, manganese, nickel, and vanadium; detected in both the inlet and outfall transect sediment, but primarily in the inlet sediment.

Arsenic and chromium were also identified as human health risk drivers in the RI/HHRA/ERA and were present at concentrations exceeding the adjusted residential soil RBCs (4.3 mg/kg and 230 mg/kg, respectively) in both inlet and outfall sediment.

Chromium concentrations were also above the reference UTL (43.2 mg/kg), the highest concentrations occurred in the inlet sediment. All the arsenic concentrations were below the reference UTL (30.4 mg/kg).

Total Organic Carbon. In the inlet sediment, TOC values ranged from 2,050 mg/kg to 71,000 mg/kg. The lowest TOC concentrations occurred in the western drainage ditch to the inlet at SJS02-SD01 and SD04 (2,050 mg/kg and 2,270 mg/kg, respectively). Consequently, very few inorganics were found at elevated concentrations in these samples. Higher TOC concentrations (35,000 to 44,000 mg/kg) were detected in the central portion of the inlet. The highest TOC and inorganic concentrations (57,200 mg/kg and 71,000 mg/kg) were found in the depositional areas (SJS02-SD07 and SD03, respectively).

The outfall transect sediment TOC concentrations ranged from 15,000 mg/kg to 63,000 mg/kg. Higher concentrations of inorganics were generally detected at locations with higher TOC concentrations.

Grain Size. Grain size analyses were performed on the outfall transect sediment and the results are included as Appendix C. As anticipated, the coarser materials (sand and gravel) were found in sediment collected at the outfall and an increasing amount of silts and clays, a

fining outward sequence, were found in sediment away from the inlet towards the main channel of St. Juliens Creek.

Conceptual Model

Chemicals could enter onsite surface water bodies via surficial runoff from soil. Transport of chemicals in suspended inlet sediment to St. Juliens Creek via tidal flux through the low-flow culvert. The configuration of the creek shoreline and the low-flow culvert between the Site 2 inlet and St. Juliens Creek creates a relatively low energy environment minimizing the potential for suspension of sediment except during extreme storm events.

The inlet generally contains surface water and is expected to maintain a variety of aquatic biota. Accordingly, chemicals originating from Site 2 have the potential to adversely affect aquatic life within the inlet area. It is recognized, however, St. Juliens Creek receives chemical inputs from multiple sources unrelated to Site 2, including other SJCA activities and off-site developed areas to the south and west of SJCA. Non-site-related chemicals in the sediments and surface water of the main body of St. Juliens Creek could also be transported by tidal flux into the inlet where aquatic life could be exposed to these non-site-related chemicals.

Chemicals could also partition to sediment following discharge to surface water. In general, chemical concentrations in sediment resulting from this transport pathway are a function of distance from the source(s), chemical fate properties, sediment type, and water velocity. The water velocity associated with Site 2 is expected to be relatively low, and the onsite aquatic habitats are expected to constitute depositional sinks where many chemicals would adsorb and precipitate to sediments. Chemicals may be remobilized and transported from these sinks by various physical events and chemical processes (e.g., storm events, tidal forces).

Ecological Risk Considerations

The Screening ERA (SERA) and Step 3 of the ERA process for Site 2 (CH2M HILL, 2004) indicated a potential for adverse effects to benthic-dwelling organisms from the presence of chemicals in the Site 2 inlet sediments and a limited potential for adverse effects to avian piscivores and reptiles from the presence of mercury in sediment. The ERA indicated the possibility that chemicals in the Site 2 inlet area sediments could be transported to the main body of St. Juliens Creek. The additional data presented in this memorandum indicates only a localized area of potential impact in St. Juliens Creek, at a location that is immediately adjacent to where the inlet discharges to St. Juliens Creek. Based on this very localized area of potential impact, the overall potential for chemicals originating from the Site 2 inlet drainage to impact ecological receptors in St. Juliens Creek is considered low and does not warrant further detailed investigation.

Presumptive remedies (removal/soil cover) have been recommended for Site 2 soils. These remedies would reduce or eliminate the potential for chemicals associated with Site 2 soils to impact inlet sediments in the future. However, there remains the potential for chemicals in the Site 2 inlet drainage sediments, including the point where the inlet discharges to St. Juliens Creek, to adversely affect benthic-dwelling organisms. As discussed in the Site 2 SERA and Step 3 ERA conclusions (CH2M HILL, 2004), limited bioassays are recommended to further

characterize the toxicity of these sediments to benthic-dwelling organisms. Additional sediment chemical analytical data collected as part of this bioassay investigation could also be used to further investigate the low level risks that were indicated to avian piscivores/reptiles from the presence of mercury in Site 2 sediments.

Conclusions

Potential human health and ecological risks from exposure to Site 2 inlet sediment were identified in the RI/HHRA/ERA. The RI/HHRA/ERA data were compared to the reference UTLs generated as part of this technical memorandum. Several SVOCs, pesticides, and inorganics were present in the inlet sediment at elevated concentrations, indicating that these chemicals are site-related. The potential source of these chemicals to the inlet is from surface water runoff and erosion of constituents in surface soils that deposit as sediment.

The Expanded RI data indicated that although several constituent concentrations exceeded the reference UTLs in the outfall transect sediment, the highest concentrations occurred within the inlet and at the outfall locations (SJS02-SD08 and SD20). Only a few inorganics, pesticides, and bis(2-ethylhexyl)phthalate occurred in the outfall transect sediment at concentrations above the reference UTLs and with the exception of and bis(2-ethylhexyl)phthalate, these concentrations were significantly lower than the inlet sediment. Although Site 2 is potentially contributing, or has historically contributed, chemicals to St. Juliens Creek via tidal influx through the low-flow culvert, significant site-related effects are only indicated in a localized area directly at the outfall location.

Removal and/or soil cover have been recommended to reduce or eliminate the potential for chemicals associated with Site 2 soils to impact inlet sediments in the future. However, there remains the potential for chemicals in the inlet sediments, including the point where the inlet discharges to St. Juliens Creek, to adversely affect benthic-dwelling organisms. As concluded in the ERA, limited bioassays are recommended to further characterize the toxicity of the inlet sediments to benthic-dwelling organisms. Additional sediment chemical analytical data collected as part of this bioassay investigation could also be used to further investigate the low level risks that were indicated to avian piscivores/reptiles from the presence of mercury in inlet sediments.

The contents of this technical memorandum will be incorporated into the addendum to the RI/HHRA/ERA for Site 2, following additional groundwater delineation tentatively scheduled for fall 2004. Following the Site 2 RI/HHRA/ERA addendum and recommended bioassay investigation, the Navy will develop remedial action objectives (RAOs) to address potential risks to human health and the environment and an FS will be developed to evaluate remedial action alternatives at Site 2. Remedial alternatives for all Site 2 media will need to be evaluated and implemented in a logical sequence to prevent recontamination of media.

References

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Table 1
Overlying Surface Water Field Parameters Collected at Sediment Sample Locations
Site 2
St. Juliens Creek Annex, Chesapeake, Virginia

Station ID	Reference Sediment Locations				Outfall Transect Sediment Locations					
	SJREF-SD01-00	SJREF-SD02-00	SJREF-SD04-00	SJREF-SD05-00	SJS02-SD15-00	SJS02-SD16-00	SJS02-SD17-00	SJS02-SD18-00	SJS02-SD19-00	SJS02-SD20-00
Sample ID	SJREF-SD01-00-04A	SJREF-SD02-00-04A	SJREF-SD04-00-04A	SJREF-SD05-00-04A	SJS02-SD15-00-04A	SJS02-SD16-00-04A	SJS02-SD17-00-04A	SJS02-SD18-00-04A	SJS02-SD19-00-04A	SJS02-SD20-00-04A
Sample Date	01/06/2004	01/06/2004	01/06/2004	01/06/2004	01/06/2004	01/06/2004	01/06/2004	01/06/2004	01/06/2004	01/06/2004
Field Parameters										
Dissolved Oxygen (mg/L)	9.29	0	8.53	8.74	10.2	10.27	10.57	9.7	9.2	9.43
Oxidation Reduction Potential (mV)	121	261	116	125	129	155	97	112	119	88
pH (pH)	7.12	6.67	6.95	7	7.31	7.31	7.15	7.29	7.33	7.12
Salinity (%)	1.09	0.2	0.94	0.91	1.22	1.57	1.17	1.28	1.28	1.08
Specific Conductance (ms/cm)	18.6	3.28	1.62	17.5	20.5	26	20.4	21.4	21.4	18.3
Temperature (C)	13.61	13.4	13.4	13.4	13.4	11.9	13.4	13.5	13.7	13.1
Turbidity (NTU)	0	14.9	0	0	0	0	0	0	0	0

Table 2
Observed Inorganic Releases from the Hazard Ranking System
Site 2
St. Juliens Creek Annex, Chesapeake, Virginia

Tetra Tech Sample No.	Units	CRDL	SD-9	SD-11	SD-12	SD-13	SD-13	SD-14
CLP Sample No.			MCHWH20	MCWJ22	MCWJ23	MCWJ24	MCWY90	MCWJ25
Date Sampled			02/04/1999	02/04/1999	02/04/1999	02/04/1999	02/04/1999	02/04/1999
% Solids			80.3	75.4	76.1	58.8	60.9	44.3
Inorganics								
Copper	MG/KG	5	7.30	28.60	30.20	55.30	42.40	72.20
Lead	MG/KG	0.6	7.30	21.90	20.20	53.80	73.60	97.20
Magnesium	MG/KG	1000	(1110.00)	(1200.00)	2730.00	2640.00	6000.00	3050.00
Manganese	MG/KG	3	20.20	24.60	33.70	66.20	110.00	110.00
Nickel	MG/KG	8	(3.60)	(3.90)	(3.80)	(8.20)	(9.00)	(16.50)
Selenium	MG/KG	1	ND	ND	1.6 K	UL	2.00 K	(1.80) K
Thallium	MG/KG	2	ND	ND	(1.10)	(1.60) L	(2.40)	ND
Zinc	MG/KG	4	15.20	131.00	91.50 L	188.00	219.00	241.00

Notes:

- B Not detected substantially above the level reported in laboratory field blanks.
- K Analyte present. Reported value may be biased high. Actual value is expected to be lower.
- UL Not detected, quantitation limit is probably higher.
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher.
- BOLD** Concentration meets criteria for observed release as given in HRS.
- CRDL Contract Required Detection Limit
- MG/KG Milligrams per kilogram
- SD Sediment
- () Analyte present. As values approached the instrument Detection Limit (IDL) the quantitation limit may not be accurate.

Table 3
Observed Organic Releases from the Hazard Ranking System
Site 2
St. Juliens Creek Annex, Chesapeake, Virginia

Tetra Tech Sample No.	Units	CRQL	SD-9	SD-13	SD-14
CLP Sample No.			CTB96	CTH00	CTH01
Date Sampled			02/04/1999	02/04/1999	02/04/1999
% Moisture			20	36	70
Base Neutral Acids					
Acenaphthylene	UG/KG	330	ND	600	190 J
Phenanthrene	UG/KG	330	ND	1800	320 J
Anthracene	UG/KG	330	ND	1400	290 J
Fluoranthene	UG/KG	330	ND	9200*	2500
Pyrene	UG/KG	330	ND	8100*	1900
Benzo(a)anthracene	UG/KG	330	ND	4400*	1200
Chrysene	UG/KG	330	ND	4400*	1500
Benzo(b)fluoranthene	UG/KG	330	ND	4800*	2100
Benzo(k)fluoranthene	UG/KG	330	ND	2500	1900
Benzo(a)pyrene	UG/KG	330	ND	2700	1400
Indeno(1,2,3-cd)pyrene	UG/KG	330	ND	1400	550 J
Dibenz(a,h)anthracene	UG/KG	330	ND	670	180 J
Benzo(g,h,i)perylene	UG/KG	330	ND	780	340 J
Pesticides and Polychlorinated Biphenyls					
4,4'-DDE	UG/KG	3.3	ND	16	70
Endosulfan sulfate	UG/KG	3.3	ND	ND	93
4,4'-DDT	UG/KG	3.3	ND	ND	34 J
4,4'-DDD	UG/KG	3.3	ND	20	ND

Notes:

- B Not detected substantially above the level reported in laboratory field blanks.
- BOLD** Concentration meets criteria for observed release as given in HRS.
- CRQL Contract Required Quantitation Limit
- UG/KG Micrograms per kilogram
- J Analyte present. Reported value may not be accurate or precise.
- ND Not Detected
- *
- SD Results reported from a diluted analysis
- Sediment

Table 4
Reference Summary Statistics
St. Juliens Creek
St. Juliens Creek Annex, Chesapeake, Virginia

Parameter	Units	Reference UTL	Assumed Distribution for UTL	Percentile Estimated	Mean	Median	Standard Deviation	Frequency of Detects	Minimum	Minimum Flag	Maximum Detect	Maximum Detect Flag	Normality p-value	Lognormality p-value
Aluminum	MG/KG	20,700	Nonparametric	84	7,850	5,510	7,100	17/17	469		20,700		0.007	0.338
Arsenic	MG/KG	30.4	Nonparametric	84	7.63	6.2	7.58	17/17	0.96	J	30.4		0.002	0.747
Barium	MG/KG	68.4	Normal	95	24.1	24.9	17.8	16/17	4	J	58.9	J	0.077	0.024
Beryllium	MG/KG	2.1	Nonparametric	84	0.496	0.44	0.497	16/17	0.09	J	2.1		0.001	0.534
Cadmium	MG/KG	1.4	Nonparametric	84	0.359	0.19	0.405	15/17	0.08	J	1.4	J	0.000	0.478
Calcium	MG/KG	5,200	Nonparametric	84	1,670	1,520	1,440	16/17	281	J	5,200		0.031	0.001
Chromium	MG/KG	43.2	Nonparametric	84	18.8	14	15	17/17	0.99	K	43.2	K	0.036	0.159
Cobalt	MG/KG	9.5	Nonparametric	84	3.41	2.5	3.05	15/17	0.75	J	9.5	J	0.034	0.018
Copper	MG/KG	122	Nonparametric	84	36.8	26.1	32.8	17/17	0.8	J	122		0.035	0.158
Iron	MG/KG	32,700	Nonparametric	84	12,400	8,140	11,000	17/17	599		32,700		0.017	0.284
Lead	MG/KG	128	Normal	95	46.8	37	32.6	17/17	3.7	K	104	K	0.078	0.088
Magnesium	MG/KG	6,380	Nonparametric	84	2,300	1,510	2,180	16/17	108	J	6,380		0.009	0.002
Manganese	MG/KG	202	Nonparametric	84	71	38.2	68.9	17/17	2.4	K	202		0.006	0.448
Mercury	MG/KG	1.4	Nonparametric	84	0.304	0.2	0.361	16/17	0.03	L	1.4	L	0.001	0.920
Nickel	MG/KG	24.2	Normal	95	8.07	6	6.5	16/17	1.5	J	19.9		0.066	0.012
Potassium	MG/KG	3,490	Nonparametric	84	1,140	684	1,200	17/17	44.9	J	3,490		0.001	0.584
Selenium	MG/KG	1.5	Nonparametric	84	0.54	0.395	0.378	5/17	0.54	J	1.5	J	0.001	0.070
Sodium	MG/KG	9,410	Nonparametric	84	3,390	1,930	3,030	15/17	36.7	J	9,410		0.047	0.005
Vanadium	MG/KG	57	Normal	95	19.3	15.3	15.1	17/17	1.8	J	55.9		0.066	0.485
Zinc	MG/KG	418	Normal	95	141	116	111	16/17	30.3		422		0.119	0.000
4,4'-DDD	MG/KG	0.0072	Nonparametric	78	0.00334	0.00295	0.00138	4/12	0.0026	L	0.0072	L	0.002	0.077
4,4'-DDE	MG/KG	0.1	Nonparametric	84	0.0193	0.0064	0.0265	12/17	0.004	J	0.1		0.000	0.131
4,4'-DDT	MG/KG	0.013	Nonparametric	83	0.0054	0.00403	0.00358	9/16	0.0013	J	0.013	L	0.040	0.916
Methoxychlor	MG/KG	0.3	Nonparametric	74	0.0639	0.0173	0.0964	3/10	0.06		0.3		0.000	0.015
Acenaphthene	MG/KG	0.071	Nonparametric	72	0.295	0.305	0.109	1/9	0.071	J	0.071	J	0.328	0.006
Acenaphthylene	MG/KG	0.31	Nonparametric	72	0.226	0.245	0.103	4/9	0.061	L	0.31	J	0.614	0.140
Anthracene	MG/KG	0.492	Normal	95	0.204	0.24	0.102	6/11	0.045	L	0.29	J	0.746	0.242
Benzo(a)anthracene	MG/KG	1.3	Nonparametric	79	0.401	0.245	0.393	12/13	0.054	J	1.3	L	0.018	0.741
Benzo(a)pyrene	MG/KG	1.1	Nonparametric	79	0.395	0.27	0.352	11/13	0.05	J	1.1	L	0.027	0.516
Benzo(b)fluoranthene	MG/KG	3.3	Nonparametric	79	0.715	0.32	0.923	12/13	0.074	J	3.3		0.001	0.646
Benzo(g,h,i)perylene	MG/KG	0.672	Normal	95	0.292	0.245	0.139	8/12	0.13	L	0.55	L	0.226	0.613
Benzo(k)fluoranthene	MG/KG	1.4	Nonparametric	79	0.346	0.24	0.356	10/13	0.059	L	1.4		0.001	0.805
Carbazole	MG/KG	0.644	Normal	95	0.271	0.275	0.128	2/10	0.048	L	0.079	J	0.255	0.008
Chrysene	MG/KG	1.5	Nonparametric	81	0.453	0.228	0.457	13/14	0.062	J	1.5	L	0.009	0.469
Dibenz(a,h)anthracene	MG/KG	0.41	Nonparametric	72	0.221	0.24	0.121	5/9	0.05	L	0.41	J	0.558	0.132
Diethylphthalate	MG/KG	0.608	Normal	95	0.286	0.275	0.111	2/10	0.05	L	0.22	L	0.337	0.002
Fluoranthene	MG/KG	2.6	Nonparametric	81	0.691	0.375	0.752	13/14	0.069	L	2.6	L	0.004	0.823
Indeno(1,2,3-cd)pyrene	MG/KG	0.624	Normal	95	0.256	0.245	0.137	10/13	0.053	L	0.51	L	0.451	0.498
Phenanthrene	MG/KG	0.92	Nonparametric	78	0.314	0.278	0.223	7/12	0.062	L	0.92		0.015	0.716
Pyrene	MG/KG	1.9	Nonparametric	81	0.528	0.3	0.549	13/14	0.065	L	1.9	L	0.003	0.904
bis(2-ethylhexyl)phthalate	MG/KG	0.44	Normal	95	0.155	0.135	0.0977	3/10	0.044	J	0.15	J	0.137	0.208
2-Butanone	MG/KG	0.0175	Normal	95	0.00891	0.0075	0.00305	4/11	0.005	J	0.012	J	0.166	0.840
4-Methyl-2-pentanone	MG/KG	0.016	Normal	95	0.0075	0.00725	0.00312	5/12	0.003	J	0.008	J	0.109	0.388
Carbon disulfide	MG/KG	0.006	Nonparametric	79	0.00681	0.0065	0.00336	5/13	0.002	J	0.006	J	0.025	0.223
Chloromethane	MG/KG	0.009	Nonparametric	76	0.00773	0.0075	0.00268	2/11	0.002	J	0.009	J	0.039	0.001
Toluene	MG/KG	0.0188	Normal	95	0.00721	0.00725	0.00424	4/12	0.002	J	0.005	J	0.202	0.219
Total Organic Carbon (TOC)	MG/KG	89,900	Nonparametric	84	25,600	16,000	24,000	17/17	1,820		89,900		0.013	0.399

Notes:

p-value = probability that the observed differences would occur purely by chance

Table 5
Statistical Outliers Excluded from Reference Data Set
St. Juliens Creek
St. Juliens Creek Annex, Chesapeake, Virginia

Parameter	Sample ID	Validation Flag	Result (MG/KG)
Aluminum	SJREF-SD01-00-04A		20,700
Aluminum	SJREF-SD03-00-04A-P		19,200
Aluminum	SJREF-SD05-00-04A		18,000
Aluminum	SJREF-SD04-00-04A		17,400
Aluminum	SJSBK-SD05-001	K	14,100
Arsenic	SJSBK-SD05-001		30.4
Beryllium	SJSBK-SD05-001		2.1
Cadmium	SJSBK-SD05-001	J	1.4
Cadmium	SJSBK-SD02-002	J	1.1
Cadmium	SJSBK-SD02-001	J	1
Calcium	SJSBK-SD12-001		5,200
Cyanide	SJREF-SD05-00-04A		4.5
Cyanide	SJREF-SD03-00-04A-P		2
Mercury	SJSBK-SD04-002	L	1.4
Mercury	SJREF-SD01-00-04A		0.74
Mercury	SJREF-SD05-00-04A		0.61
Mercury	SJREF-SD03-00-04A-P		0.6
Potassium	SJREF-SD01-00-04A		3,490
Potassium	SJREF-SD04-00-04A		3,190
Potassium	SJREF-SD03-00-04A-P		2,950
Potassium	SJREF-SD05-00-04A		2,940
Selenium	SJSBK-SD05-001	J	1.5
Selenium	SJSBK-SD02-002	J	1.3
Selenium	SJSBK-SD05-002	J	1
Selenium	SJSBK-SD02-001	J	0.74
Silver	SJREF-SD01-00-04A	J	1.8
Silver	SJREF-SD05-00-04A	J	1.5
Silver	SJREF-SD03-00-04A-P	J	1.5
Silver	SJREF-SD04-00-04A	J	1.4
Silver	SJSBK-SD12-001	J	0.22
4,4'-DDD	SJSBK-SD05-001		0.092
4,4'-DDD	SJSBK-SD02-002	L	0.039
4,4'-DDD	SJSBK-SD12-001	L	0.016
4,4'-DDD	SJSBK-SD04-002P		0.012
4,4'-DDD	SJSBK-SD05-002	L	0.0088
4,4'-DDE	SJSBK-SD05-001		0.1
4,4'-DDE	SJSBK-SD05-002	L	0.06
4,4'-DDE	SJSBK-SD12-001	L	0.046
Methoxychlor	SJREF-SD01-00-04A		0.3
Methoxychlor	SJREF-SD03-00-04A-P		0.17
Methoxychlor	SJREF-SD05-00-04A		0.06
Benzo(b)fluoranthene	SJREF-SD01-00-04A		3.3
Benzo(b)fluoranthene	SJREF-SD03-00-04A-P		1.6
Benzo(b)fluoranthene	SJREF-SD05-00-04A		1.4
Benzo(k)fluoranthene	SJREF-SD01-00-04A		1.4
Benzo(k)fluoranthene	SJSBK-SD02-002	L	0.58
Benzo(k)fluoranthene	SJREF-SD03-00-04A-P	J	0.52
Benzo(k)fluoranthene	SJREF-SD05-00-04A	J	0.46
Fluoranthene	SJSBK-SD02-002	L	2.6
Fluoranthene	SJREF-SD01-00-04A		1.6
Fluoranthene	SJSBK-SD04-002P		1.6
Phenanthrene	SJSBK-SD04-002P		0.92
Pyrene	SJSBK-SD02-002	L	1.9
Pyrene	SJSBK-SD04-002P		1.5
2-Butanone	SJSBK-SD05-002	J	0.093
2-Butanone	SJSBK-SD05-001	UJ	0.016
4-Methyl-2-pentanone	SJSBK-SD02-002	U	0.0135
Acetone	SJSBK-SD04-002P	J	0.34
Acetone	SJSBK-SD05-002	J	0.24
Acetone	SJSBK-SD03-002		0.157

Table 5
Statistical Outliers Excluded from Reference Data Set
St. Juliens Creek
St. Juliens Creek Annex, Chesapeake, Virginia

Parameter	Sample ID	Validation Flag	Result (MG/KG)
Acetone	SJSBK-SD05-001	J	0.032
Carbon disulfide	SJSBK-SD05-001	UJ	0.016
Chloromethane	SJSBK-SD05-001	U	0.016
Chloromethane	SJSBK-SD02-002	U	0.0135
Total Organic Carbon (TOC)	SJSBK-SD05-002		89900
Carbon disulfide	SJSBK-SD05-001	UJ	0.016
Chloromethane	SJSBK-SD05-001	U	0.016
Chloromethane	SJSBK-SD02-002	U	0.0135
Methylene chloride	SJSBK-SD05-001	B	0.032
Methylene chloride	SJSBK-SD02-002	B	0.027
Methylene chloride	SJSBK-SD05-002	B	0.026
Trichloroethene	SJSBK-SD05-001	UJ	0.016
Trichloroethene	SJSBK-SD02-002	U	0.0135
Trichloroethene	SJSBK-SD04-001	B	0.013
Total Organic Carbon (TOC)	SJSBK-SD05-002		89,900

Notes:

B - Analyte not detected above associated blank

J - Reported value is estimated

K - Reported value may be biased high

L - Reported value may be biased low

U - Analyte not detected

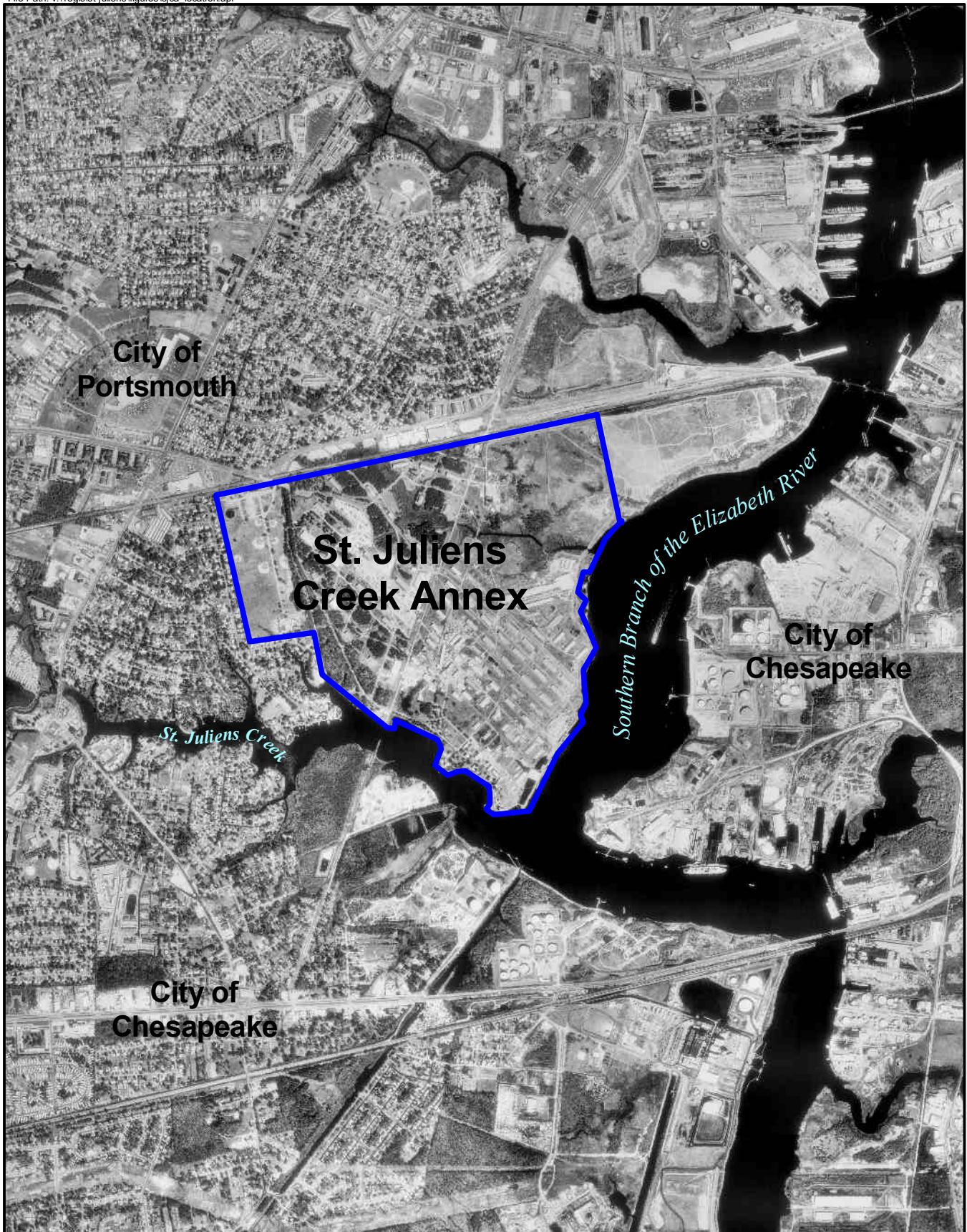
Table 6

Inlet and Outfall Transect Sediment Exceedances of Reference UTLS

Site 2

St. Juliens Creek Annex, Chesapeake, Virginia

Station ID	Soil Residential RBC (Adjusted x 10)	BTAG-Sediment Flora/Fauna	Reference UTL	Inlet Sediment										Outfall Transect Sediment										Former Sediment Location	
				SJS02-SD01	SJS02-SD02	SJS02-SD03 ¹	SJS02-SD04	SJS02-SD05	SJS02-SD06	SJS02-SD07	SJS02-SD09	SJS02-SD08	SJS02-SD15	SJS02-SD16	SJS02-SD17	SJS02-SD18	SJS02-SD19	SJS02-SD20	SJSBK-SD01	SJSBK-SD02					
Sample ID				07/14/97	07/14/97	SJS02-SD01-000	SJS02-SD02-000	SJS02-SD03-000	SJS02-SD04-001	SJS02-SD05-001	SJS02-SD06-001	SJS02-SD07-001	SJS02-SD09	SJS02-SD08-001	SJS02-SD15-00-04A	SJS02-SD16-00-04A	SJS02-SD17-00-04A	SJS02-SD18-00-04A	SJS02-SD19-00-04A	SJS02-SD20-00-04A	SJSBK-SD01	SJSBK-SD02			
Sample Date				06/23/97		04/16/98		04/16/98		04/13/99		04/16/98		04/14/98	10/27/98	01/03/04	01/06/04	01/06/04	01/06/04	01/06/04	01/06/04	01/06/04			
Chemical Name																									
Semi-volatile Organic Compounds (UG/KG)																									
Aceanaphthalene	—	44	310	330 U	9,100 UJ	1,400 U	480 UJ	670 UJ	780 UJ	930 UJ	440 U	560 UJ	NA	96 J	180 J	80 J	180 J	640 U	220 J	610 U	NA				
Anthracene	23,000,000	85.3	492	330 U	9,100 UJ	130 L	480 UJ	170 J	100 J	930 UJ	440 U	560 UJ	NA	83 J	140 J	81 J	120 J	640 U	410 J	610 U	170 L				
Benz(a)anthracene	8,700	261	1,330	87 J	9,100 UJ	440 L	480 UJ	1,300 J	380 J	930 UJ	100 J	68 J	160 L	250 J	540 J	250 J	470 J	89 J	1,100	300 J	1,300 L				
Benz(a)pyrene	870	430	1,100	79 J	9,100 UJ	660 L	480 UJ	910 J	360 J	930 UJ	100 J	61 J	100 L	680	520	1,100	84 J	1,600	270 J	1,100 L					
Benz(b)fluoranthene	8,700	3,200	3,300	183 J	1,200 J	1,300 L	480 UJ	1,200 J	460 J	930 UJ	110 J	170 J	260 L	1,230	1,600	870	1,700	230 J	2,800	500 J	NA				
Benz(g,h)perylene	2,300,000	670	672	83 J	9,100 UJ	560 L	480 UJ	690 J	230 J	930 UJ	440 U	63 J	130 L	700 U	88 J	280 J	560 J	640 U	780	150 J	550 L				
Benz(k)fluoranthene	87,000	240	1,400	59 J	9,100 UJ	470 J	480 UJ	420 J	170 J	930 UJ	60 J	77 J	130 L	340 J	630 J	340 J	580 J	78 J	970	160 J	580 L				
Butylbenzophenone	10,000,000	63	—	47 J	9,100 UJ	1,300 UL	480 UJ	670 UJ	760 UJ	930 UJ	440 U	550 UU	NA	30 J	700 U	490 U	670 U	640 U	750 U	610 U	NA				
Carcinene	870,000	364	1,500	133 J	9,100 UJ	680 L	480 UJ	1,400 J	360 J	930 UJ	120 J	550 L	610 J	370 J	680	62 J	1,800	360 J	1,500 L						
D-n-butylphthalate	7,600,000	1,400	—	41 B	9,100 UJ	1,300 UL	480 UJ	89 J	94 J	930 UJ	440 U	550 UU	NA	700 U	700 U	490 U	670 U	840 U	750 U	610 U	NA				
Dibenz(a,h)anthracene	870	63.4	410	330 U	9,100 UJ	1,300 UL	480 UJ	670 UJ	760 UJ	930 UJ	440 U	560 UU	NA	120 J	210 J	100 J	190 J	640 U	280 J	67 J	NA				
Dethylalkylphthalate	63,000,000	200	608	330 U	9,100 UJ	250 L	480 UJ	670 UU	760 UU	930 UJ	440 U	560 UU	100 L	700 U	490 U	670 U	640 U	750 U	610 U	NA					
Fluoranthene	3,100,000	600	2,800	330 U	930 J	850 L	480 UJ	2,200 J	680 J	930 UJ	190 J	150 J	240 L	440 J	660	350 J	700 J	130 J	2,300	560 J	2,600 L				
Fluorene	3,100,000	19	—	330 U	9,100 UJ	1,300 UL	480 UJ	78 J	760 UJ	930 UJ	440 U	550 UU	NA	700 U	700 U	490 U	870 U	840 U	750 U	610 U	NA				
Indenc(1,2,3-cd)pyrene	8,700	600	624	84 J	9,100 UJ	530 L	480 UJ	500 J	180 J	930 UJ	440 U	76 J	100 L	330 J	470 J	270 J	500 J	640 U	750	170 J	510 L				
Phenanthrene	3,300,000	240	920	47 J	9,100 UJ	180 L	480 UJ	1,100 J	530 J	930 UJ	150 J	550 UU	160 L	700 U	110 J	57 J	78 J	640 U	190 J	220 J	420 L				
Pyrene	2,300,000	665	1,900	233 J	1,200 J	1,100 L	48 J	3,100 J	850 J	930 UJ	220 J	120 J	230 L	550 J	1,100	460 J	899	120 J	1,800	440 J	1,900 L				
bis(2-Ethylhexyl)phthalate	460,000	1,300	588	49 B	9,100 UJ	360 B	480 UJ	160 J	170 J	930 UJ	860	550 UU	110 L	5,800	1,600	250 B	1,900	95 B	110 B	610 U	120 L				
Pesticides/Polychlorinated Biphenyls (UG/KG)																									
4,4'-DDD	27,000	16	38	3.7 J	310 J	210	110 R	620 J	980 J	NA	57	12 J	91 L	7 U	7 U	22	10	64 U	83	6 B	39 L				
4,4'-DDE	19,000	2.2	100	7.5 J	71 J	120 J	13 J	61 J	70 J	34 J	5.7 J	3,80 J	NA	7 U	7 U	9.2 J	6.5 J	6.4 U	200 J	6 B	12 L				
4,4'-DDT	19,000	1.56	13	9.3	28 J	8.8 J	25 J	73 J	3,200 J	12 J	23	3,40 J	NA	7 U	7 U	3 J	6.7 U	6.4 U	11 J	6 UU	13 L				
Avodor-1254	1,600	22.7	—	33 U	110 J	120 U	47 UJ	65 UJ	78 UJ	93 UJ	44 U	64 UJ	NA	70 U	70 U	49 U	87 U	64 U	75 U	60 U	NA				
Avodor-1260	3,200	22.7	—	33 U	110 UJ	69 J	47 UJ	65 UJ	75 UJ	93 UJ	44 U	54 UU	NA	70 U	70 U	49 U	67 U	64 U	75 U	60 U	NA				
Dieldrin	400	0.715	—	3.3 U	11 UJ	36	4.70 UJ	6.5 UJ	7.5 UJ	9.30 UJ	4.4 U	5.40 UJ	NA	7 U	7 U	4.9 U	6.7 U	6.4 U	7.5 U	6 U	NA				
alpha-Chlordane	18,000	0.5	—	1.7 U	7.3 J	26	2.40 UJ	78 J	40 J	7.70 J	2.2 U	0.820 J	NA	3.6 U	3.6 U	1.6 J	3.4 U	3.3 U	8.7 J	3 U	NA				
gamma-Chlordane	18,000	0.5	—	1.7 U	9.8 J	26 J	2.40 UJ	96 J	58 J	12 J	2.2 U	1.5 J	NA	3.6 U	3.6 U	2.1 J	3.4 U	3.3 U	19 J	3 U	NA				
Inorganics (MG/KG)																									



LEGEND

St. Juliens Creek Annex



0 1000 2000 3000 Feet

Figure 1
Location of St. Juliens Creek Annex
St. Juliens Creek Annex
Chesapeake, Virginia

CH2M HILL



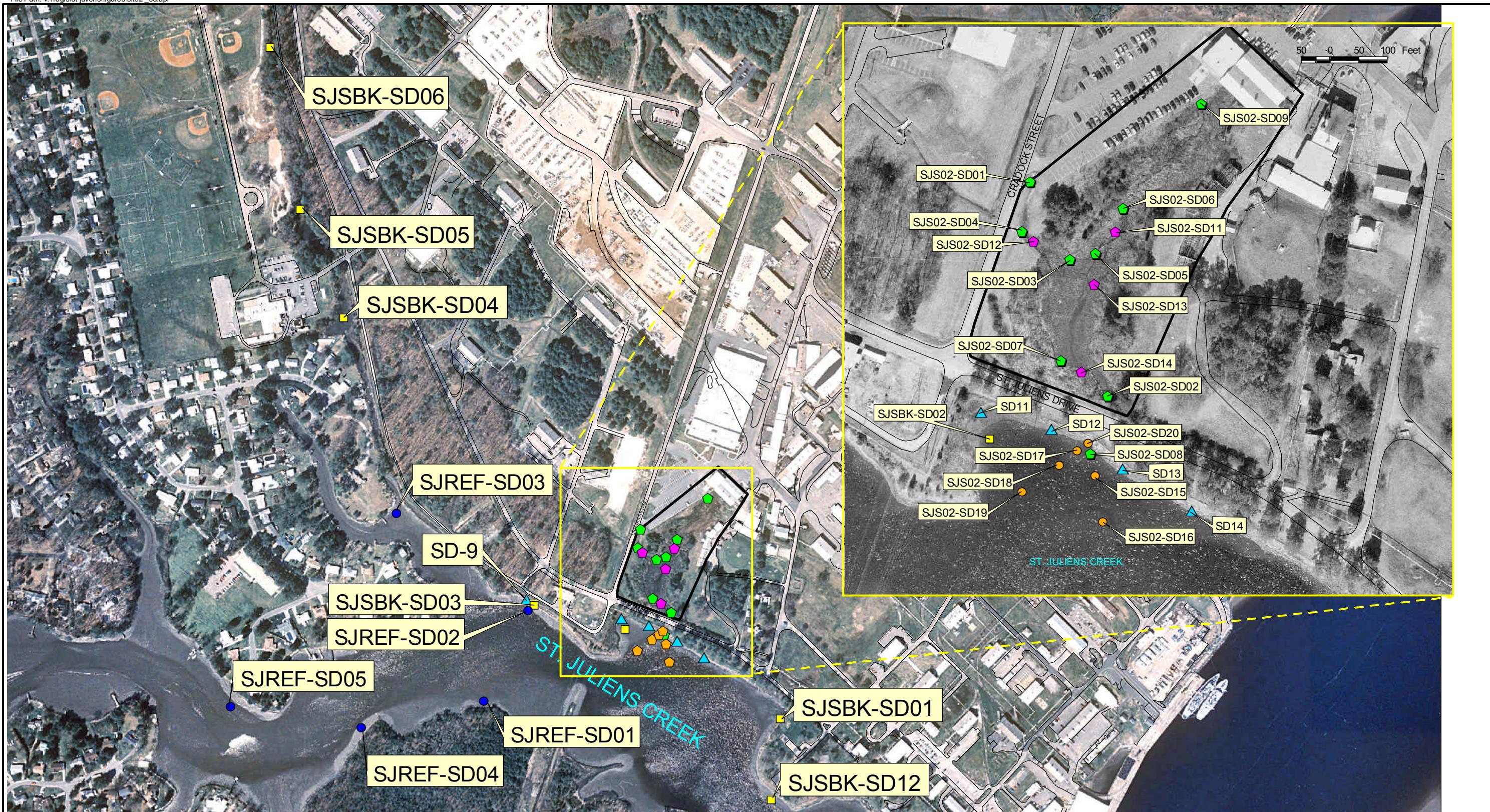
LEGEND

- Site Boundary
- Activity Boundary



0 500 1000 Feet

Figure 2
Location of Site 2
St. Juliens Creek Annex
Chesapeake, Virginia



- LEGEND**
- Site 2 Boundary
 - Background Sediment Samples
 - ◆ Inlet Sediment Samples
 - ◆ Inlet Sediment Samples (Dioxins only)
 - ▲ Hazard Ranking System Sediment Samples
 - Reference Sediment Samples
 - Outfall Transect Sediment Samples

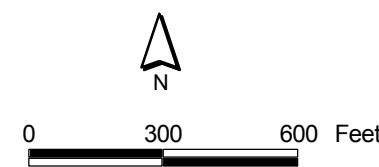


Figure 3
Sediment Sample Locations
Site 2
St. Juliens Creek Annex
Chesapeake, Virginia

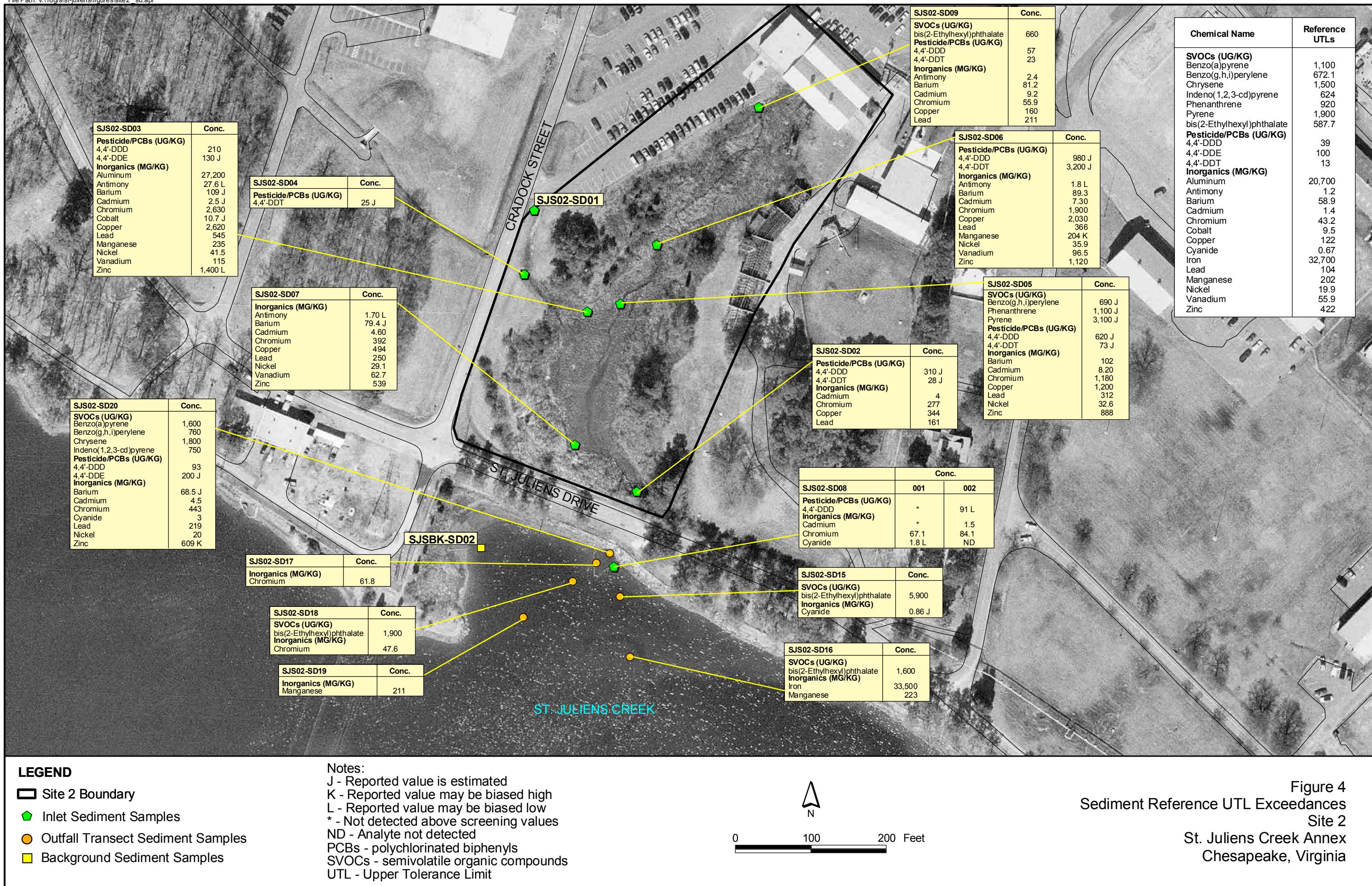


Figure 4
Sediment Reference UTL Exceedances
Site 2
St. Juliens Creek Annex
Chesapeake, Virginia

Appendix A

Analytical Data

Table A-1
Inlet Sediment Analytical Results
Site 2
St. Juliens Annex, Chesapeake, Virginia

Station ID Sample ID Sample Date	SJS02-SD01 SJS02-SD01-000 07/14/97	SJS02-SD02 SJS02-SD02-000 07/14/97	SJS02-SD03 SJS02-SD03-000 06/26/97		SJS02-SD04 SJS02-SD04-001 04/16/99	SJS02-SD05 SJS02-SD05-001 04/16/99	SJS02-SD06 SJS02-SD06-001 04/16/99	SJS02-SD07 SJS02-SD07-001 04/16/99	SJS02-SD09 SJS02-SD09 07/18/01	SJS02-SD10 SJS02-SD10 07/18/01	SJS02-SD11 SJS02-SD11 07/18/01	SJS02-SD12 SJS02-SD12 07/18/01	SJS02-SD13 SJS02-SD13 07/18/01	SJS02-SD14 SJS02-SD14 07/18/01
Chemical Name														
Volatile Organic Compounds (UG/KG)														
1,1,1-Trichloroethane	11 U	31 U	32 U	37 U	14 U	20 U	7 J	28 UJ	3.6 B	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	NA	NA	NA	NA	NA	NA	NA	NA	13 U	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
1,1-Dichloroethane	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
1,1-Dichloroethene	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	13 U	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	NA	NA	NA	NA	NA	NA	NA	NA	13 U	NA	NA	NA	NA	NA
1,2-Dibromoethane	NA	NA	NA	NA	NA	NA	NA	NA	13 U	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	13 U	NA	NA	NA	NA	NA
1,2-Dichloroethane	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
1,2-Dichloroethene (total)	11 U	31 U	32 U	9 J	14 U	20 U	23 U	3 J	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	13 U	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	13 U	NA	NA	NA	NA	NA
2-Butanone	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
2-Hexanone	11 U	31 U	32 U	37 U	14 UU	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	11 U	5 J	32 U	37 U	14 UU	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
Acetone	11 U	92 J	120	450	NA	21 J	37 J	28 UJ	13 U	NA	NA	NA	NA	NA
Benzene	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
Bromodichloromethane	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
Bromoform	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
Bromomethane	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	6.3 J	NA	NA	NA	NA	NA
Carbon disulfide	11 U	31 U	24 J	81	14 U	8 B	3 B	12 B	13 U	NA	NA	NA	NA	NA
Carbon tetrachloride	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
Chlorobenzene	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
Chloroethane	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
Chloroform	11 U	31 U	32 U	37 U	14 U	20 U	23 U	3 J	13 U	NA	NA	NA	NA	NA
Chloromethane	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
Cumene	NA	NA	NA	NA	NA	NA	NA	NA	13 U	NA	NA	NA	NA	NA
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	13 U	NA	NA	NA	NA	NA
Dibromochloromethane	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
Dichlorodifluoromethane(Freon-12)	NA	NA	NA	NA	NA	NA	NA	NA	13 UJ	NA	NA	NA	NA	NA
Ethylbenzene	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
Methyl acetate	NA	NA	NA	NA	NA	NA	NA	NA	13 U	NA	NA	NA	NA	NA
Methyl-tert-butyl ether (MTBE)	NA	NA	NA	NA	NA	NA	NA	NA	13 U	NA	NA	NA	NA	NA
Methylcyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	13 U	NA	NA	NA	NA	NA
Methylene chloride	22 B	69 B	93 B	140 B	4 B	26 B	52 B	6 B	6.3 B	NA	NA	NA	NA	NA
Styrene	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
Tetrachloroethene	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
Toluene	11 U	31 U	32 U	37 U	4 J	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
Trichloroethene	11 U	31 U	32 U	37 U	4 J	23 U	28 UJ	13 U	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane(Freon-11)	NA	NA	NA	NA	NA	NA	NA	NA	13 UJ	NA	NA	NA	NA	NA
Vinyl chloride	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
Xylene, total	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA

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Site 2
St. Juliens Annex, Chesapeake, Virginia

Station ID Sample ID Sample Date	SJS02-SD01 SJS02-SD01-000 07/14/97	SJS02-SD02 SJS02-SD02-000 07/14/97	SJS02-SD03 SJS02-SD03-000 06/26/97		SJS02-SD04 SJS02-SD04-001 04/16/99	SJS02-SD05 SJS02-SD05-001 04/16/99	SJS02-SD06 SJS02-SD06-001 04/16/99	SJS02-SD07 SJS02-SD07-001 04/16/99	SJS02-SD09 SJS02-SD09 07/18/01	SJS02-SD10 SJS02-SD10 07/18/01	SJS02-SD11 SJS02-SD11 07/18/01	SJS02-SD12 SJS02-SD12 07/18/01	SJS02-SD13 SJS02-SD13 07/18/01	SJS02-SD14 SJS02-SD14 07/18/01
Chemical Name														
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	13 U	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
o-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	13 U	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	13 U	NA	NA	NA	NA	NA
trans-1,3-Dichloropropene	11 U	31 U	32 U	37 U	14 U	20 U	23 U	28 UJ	13 U	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)														
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	NA	NA	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	840 U	23,000 UJ	3,300 UL	3,600 UL	1,200 UJ	1,700 UJ	1,900 UJ	2,300 UJ	1,100 U	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	330 U	9,100 UJ	1,300 UL	1,400 UL	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
2,4-Dichlorophenol	330 U	9,100 UJ	1,300 UL	1,400 UL	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
2,4-Dimethylphenol	330 U	9,100 UJ	1,300 UL	1,400 UL	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
2,4-Dinitrophenol	840 UJ	23,000 UJ	NA	3,600 UL	1,200 UJ	1,700 UJ	1,900 UJ	2,300 UJ	1,100 U	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
2-Chloronaphthalene	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
2-Chlorophenol	330 U	9,100 UJ	1,300 UL	1,400 UL	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
2-Methylnaphthalene	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
2-Methylphenol	330 U	9,100 UJ	1,300 UL	1,400 UL	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
2-Nitroaniline	840 U	23,000 UJ	3,300 UL	3,600 U	1,200 UJ	1,700 UJ	1,900 UJ	2,300 UJ	1,100 U	NA	NA	NA	NA	NA
2-Nitrophenol	330 U	9,100 UJ	1,300 UL	1,400 UL	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
3- and 4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA
3-Nitroaniline	840 U	23,000 UJ	3,300 UL	3,600 U	1,200 UJ	1,700 UJ	1,900 UJ	2,300 UJ	1,100 U	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	840 U	23,000 UJ	3,300 UL	3,600 UL	1,200 UJ	1,700 UJ	1,900 UJ	2,300 UJ	1,100 U	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	330 U	9,100 UJ	1,300 UL	1,400 UL	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
4-Chloroaniline	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
4-Methylphenol	330 U	9,100 UJ	1,300 UL	1,400 UL	480 UJ	670 UJ	760 UJ	930 UJ	NA	NA	NA	NA	NA	NA
4-Nitroaniline	840 U	23,000 UJ	3,300 UL	3,600 U	1,200 UJ	1,700 UJ	1,900 UJ	2,300 UJ	1,100 U	NA	NA	NA	NA	NA
4-Nitrophenol	840 U	23,000 UJ	3,300 UL	3,600 UL	1,200 UJ	1,700 UJ	1,900 UJ	2,300 UJ	1,100 U	NA	NA	NA	NA	NA
Acenaphthene	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Acenaphthylene	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA
Anthracene	330 U	9,100 UJ	130 L	1,400 U	480 UJ	170 J	100 J	930 UJ	440 U	NA	NA	NA	NA	NA
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA
Benzo(a)anthracene	87 J	9,100 UJ	440 L	240 J	480 UJ	1,300 J	380 J	930 UJ	100 J	NA	NA	NA	NA	NA
Benzo(a)pyrene	79 J	9,100 UJ	660 L	370 J	480 UJ	910 J	360 J	930 UJ	100 J	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	160 J	1,200 J	1,300 L	740 J	480 UJ	1,200 J	460 J	930 UJ	110 J	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	86 J	9,100 UJ	580 L	310 J	480 UJ	690 J	230 J	930 UJ	440 U	NA	NA	NA	NA	NA

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Chemical Name														
Benzo(k)fluoranthene	59 J	9,100 UJ	440 L	470 J	480 UJ	420 J	170 J	930 UJ	60 J	NA	NA	NA	NA	NA
Butylbenzylphthalate	47 J	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA
Carbazole	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Chrysene	130 J	9,100 UJ	680 L	330 J	480 UJ	1,400 J	360 J	930 UJ	120 J	NA	NA	NA	NA	NA
Di-n-butylphthalate	41 B	9,100 UJ	1,300 UL	1,400 U	480 UJ	89 J	94 J	930 UJ	440 U	NA	NA	NA	NA	NA
Di-n-octylphthalate	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Dibenzofuran	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Diethylphthalate	330 U	9,100 UJ	250 L	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Dimethyl phthalate	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Fluoranthene	330 U	930 J	850 L	510 J	480 UJ	2,200 J	880 J	930 UJ	190 J	NA	NA	NA	NA	NA
Fluorene	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	79 J	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Hexachlorobenzene	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Hexachlorobutadiene	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	330 UJ	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Hexachloroethane	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	84 J	9,100 UJ	530 L	260 J	480 UJ	500 J	180 J	930 UJ	440 U	NA	NA	NA	NA	NA
Isophorone	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Naphthalene	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Nitrobenzene	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Pentachlorophenol	840 U	23,000 UJ	3,300 UL	3,600 UL	1,200 UJ	1,700 UJ	1,900 UJ	2,300 UJ	1,100 U	NA	NA	NA	NA	NA
Phenanthrene	47 J	9,100 UJ	190 L	1,400 U	480 UJ	1,100 J	530 J	930 UJ	150 J	NA	NA	NA	NA	NA
Phenol	330 U	9,100 UJ	1,300 UL	1,400 UL	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Pyrene	230 J	1,200 J	1,100 L	600 J	48 J	3,100 J	850 J	930 UJ	220 J	NA	NA	NA	NA	NA
bis(2-Chloroethoxy)methane	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	49 B	9,100 UJ	360 B	230 B	480 UJ	160 J	170 J	930 UJ	660	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	330 U	9,100 UJ	1,300 UL	1,400 U	480 UJ	670 UJ	760 UJ	930 UJ	440 U	NA	NA	NA	NA	NA
Pesticides/Polychlorinated Biphenyls (UG/KG)														
4,4'-DDD	3.7 J	310 J	NA	210	110 R	620 J	980 J	NA	57	NA	NA	NA	NA	NA
4,4'-DDE	7.5 J	71 J	130 J	110 J	13 J	61 J	70 J	34 J	5.7 J	NA	NA	NA	NA	NA
4,4'-DDT	9.3	28 J	12 U	8.8 J	25 J	73 J	3,200 J	12 J	23	NA	NA	NA	NA	NA
Aldrin	1.7 U	5.4 UJ	6 U	6.8 U	2.40 UJ	3.30 UJ	3.70 UJ	4.60 UJ	2.2 U	NA	NA	NA	NA	NA
Aroclor-1016	33 U	110 UJ	120 U	130 U	47 UJ	65 UJ	75 UJ	93 UJ	44 U	NA	NA	NA	NA	NA
Aroclor-1221	67 U	210 UJ	240 U	270 U	95 UJ	130 UJ	150 UJ	190 UJ	88 U	NA	NA	NA	NA	NA
Aroclor-1232	33 U	110 UJ	120 U	130 U	47 UJ	65 UJ	75 UJ	93 UJ	44 U	NA	NA	NA	NA	NA
Aroclor-1242	33 U	110 UJ	120 U	130 U	47 UJ	65 UJ	75 UJ	93 UJ	44 U	NA	NA	NA	NA	NA
Aroclor-1248	33 U	110 UJ	120 U	130 U	47 UJ	65 UJ	75 UJ	93 UJ	44 U	NA	NA	NA	NA	NA
Aroclor-1254	33 U	110 J	120 U	130 U	47 UJ	65 UJ	75 UJ	93 UJ	44 U	NA	NA	NA	NA	NA
Aroclor-1260	33 U	110 UJ	120 U	69 J	47 UJ	65 UJ	75 UJ	93 UJ	44 U	NA	NA	NA	NA	NA
Dieldrin	3.3 U	11 UJ	36	30 J	4.70 UJ	6.5 UJ	7.5 UJ	9.30 UJ	4.4 U	NA	NA	NA	NA	NA
Endosulfan I	1.7 U	5.4 UJ	6 U	6.8 U	2.40 UJ	3.30 UJ	3.70 UJ	4.60 UJ	2.2 U	NA	NA	NA	NA	NA
Endosulfan II	3.3 U	11 UJ	12 U	13 U	4.70 UJ	6.5 UJ	7.5 UJ	9.30 UJ	4.4 U	NA	NA	NA	NA	NA
Endosulfan sulfate	3.3 U	11 UJ	12 U	13 U	4.70 UJ	6.5 UJ	7.5 UJ	9.30 UJ	4.4 U	NA	NA	NA	NA	NA

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Site 2
St. Juliens Annex, Chesapeake, Virginia

Station ID Sample ID Sample Date	SJS02-SD01 SJS02-SD01-000 07/14/97	SJS02-SD02 SJS02-SD02-000 07/14/97	SJS02-SD03		SJS02-SD04 SJS02-SD04-001 04/16/99	SJS02-SD05 SJS02-SD05-001 04/16/99	SJS02-SD06 SJS02-SD06-001 04/16/99	SJS02-SD07 SJS02-SD07-001 04/16/99	SJS02-SD09 SJS02-SD09 07/18/01	SJS02-SD10 SJS02-SD10 07/18/01	SJS02-SD11 SJS02-SD11 07/18/01	SJS02-SD12 SJS02-SD12 07/18/01	SJS02-SD13 SJS02-SD13 07/18/01	SJS02-SD14 SJS02-SD14 07/18/01
Chemical Name														
Endrin	3.3 U	11 UJ	12 U	13 U	4.70 UJ	6.5 UJ	7.5 UJ	9.30 UJ	4.4 U	NA	NA	NA	NA	NA
Endrin aldehyde	3.3 U	11 UJ	12 U	13 U	4.70 UJ	6.5 UJ	7.5 UJ	9.30 UJ	4.4 U	NA	NA	NA	NA	NA
Endrin ketone	3.3 U	11 UJ	12 U	13 U	4.70 UJ	6.5 UJ	7.5 UJ	9.30 UJ	4.4 U	NA	NA	NA	NA	NA
Heptachlor	1.7 U	5.4 UJ	6 U	6.8 U	2.40 UJ	3.30 UJ	3.70 UJ	4.60 UJ	2.2 U	NA	NA	NA	NA	NA
Heptachlor epoxide	1.7 U	5.4 UJ	6 U	6.8 U	2.40 UJ	3.30 UJ	3.70 UJ	4.60 UJ	2.2 U	NA	NA	NA	NA	NA
Methoxychlor	17 U	54 UJ	60 U	68 U	24 UJ	33 UJ	37 UJ	46 UJ	22 U	NA	NA	NA	NA	NA
Toxaphene	170 U	540 UJ	600 U	680 U	240 UJ	330 UJ	370 UJ	460 UJ	220 U	NA	NA	NA	NA	NA
alpha-BHC	1.7 U	5.4 UJ	6 U	6.8 U	2.40 UJ	3.30 UJ	3.70 UJ	4.60 UJ	2.2 U	NA	NA	NA	NA	NA
alpha-Chlordane	1.7 U	7.3 J	28	18	2.40 UJ	79 J	40 J	7.70 J	2.2 U	NA	NA	NA	NA	NA
beta-BHC	1.7 U	5.4 UJ	6 U	6.8 U	2.40 UJ	3.30 UJ	3.70 UJ	4.60 UJ	2.2 U	NA	NA	NA	NA	NA
delta-BHC	1.7 U	5.4 UJ	6 U	6.8 U	2.40 UJ	3.30 UJ	3.70 UJ	4.60 UJ	2.2 U	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	1.7 U	5.4 UJ	6 U	6.8 U	2.40 UJ	3.30 UJ	3.70 UJ	4.60 UJ	2.2 U	NA	NA	NA	NA	NA
gamma-Chlordane	1.7 U	9.8 J	29 J	21 J	2.40 UJ	96 J	58 J	12 J	2.2 U	NA	NA	NA	NA	NA
Dioxin/Furans (UG/KG)														
1,2,3,6,7,8-Heptachlorodibenzo-p-dioxin	NA	NA	NA	NA	NA	NA	NA	NA	0.42 J	0.13 J	0.34 J	0.016 J	0.19 J	0.094 J
1,2,3,4,6,7,8-Heptachlorodibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	0.23 J	0.056 J	0.087 J	0.0025 J	0.048 J	0.014 J
1,2,3,4,7,8,9-Heptachlorodibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	0.021 J	0.0044 J	0.0063 J	1.30E-04 UJ	0.0036 J	7.70E-04 J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	NA	NA	NA	NA	NA	NA	NA	NA	0.0085 J	0.0023 J	0.0051 J	3.00E-04 J	0.0029 J	0.0024 J
1,2,3,4,7,8-Hexachlorodibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	0.025 J	0.0099 J	0.019 J	7.40E-04 J	0.0082 J	0.0049 I
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	NA	NA	NA	NA	NA	NA	NA	NA	0.018 J	0.0058 J	0.015 J	6.00E-04 J	0.008 J	0.004 J
1,2,3,6,7,8-Hexachlorodibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	0.06 J	0.0064 I	0.0094 J	5.00E-04 J	0.0044 J	7.60E-04 J
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	NA	NA	NA	NA	NA	NA	NA	NA	0.016 J	0.0047 J	0.013 J	0.0011 J	0.008 J	0.0047 J
1,2,3,7,8,9-Hexachlorodibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	0.002 J	1.00E-03 J	0.0023 J	1.50E-04 UJ	2.50E-04 UJ	4.00E-04 J
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	NA	NA	NA	NA	NA	NA	NA	NA	0.0036 J	0.0012 J	0.0028 J	1.70E-04 UJ	0.0012 J	0.0012 J
1,2,3,7,8-Pentachlorodibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	0.0043 J	0.0011 J	0.0027 J	2.40E-04 UJ	0.0014 J	0.0011 J
2,3,4,6,7,8-Hexachlorodibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	0.0093 J	0.0033 J	0.0068 J	3.60E-04 J	0.0024 J	1.00E-03 J
2,3,4,7,8-Pentachlorodibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	0.007 J	0.003 J	0.0061 J	4.30E-04 J	0.002 J	0.0016 J
2,3,7,8-TCDD (dioxin)	NA	NA	NA	NA	NA	NA	NA	NA	5.80E-04 J	3.40E-04 J	9.60E-04 J	1.30E-04 UJ	4.30E-04 J	3.20E-04 J
2,3,7,8-Tetrachlorodibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	0.0082 NJ	0.0034 J	0.0097 J	7.10E-04 NJ	0.0032 J	0.0037 J
Total heptachlorodibenzo-p-dioxin	NA	NA	NA	NA	NA	NA	NA	NA	0.75 J	0.26 J	0.9 J	0.051 J	0.52 J	0.28 J
Total heptachlorodibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	0.25 J	0.15 J	0.26 J	0.0046 J	0.13 J	0.014 J
Total hexachlorobenzo-p-dioxin	NA	NA	NA	NA	NA	NA	NA	NA	0.14 J	0.046 J	0.17 J	0.015 J	0.11 J	0.07 J
Total hexachlorodibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	0.3 J	0.091 J	0.19 J	0.0047 J	0.078 J	0.035 J
Total octachlorodibenzo-p-dioxin	NA	NA	NA	NA	NA	NA	NA	NA	3.2 J	1.6 J	4.4 J	0.66 J	1.9 J	1.1 J
Total octachlorodibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	0.58 J	0.074 J	0.12 J	0.003 B	0.058 J	0.021 J
Total pentachlorodibenzo-p-dioxin	NA	NA	NA	NA	NA	NA	NA	NA	0.011 J	0.0048 J	0.02 J	1.70E-04 UJ	0.0091 J	0.0097 J
Total pentachlorodibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	0.08 J	0.031 J	0.091 J	0.002 J	0.023 J	0.02 J
Total tetrachlorodibenzo-p-dioxin	NA	NA	NA	NA	NA	NA	NA	NA	0.0067 J	0.0032 J	0.0066 J	3.70E-04 J	0.005 J	0.0029 J
Total tetrachlorodibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	0.036 J	0.0056 J	0.024 J	0.0021 J	0.016 J	0.013 J
Nitramines (UG/KG)														
1,3,5-Trinitrobenzene	540 U	NA	2,000 U	2,200 U	250 U	238 U	238 U	250 U	630 U	NA	NA	NA	NA	NA
1,3-Dinitrobenzene	540 U	NA	2,000 U	2,200 U	250 U	238 U	238 U	250 U	630 U	NA	NA	NA	NA	NA
2,4,6-Trinitrotoluene	540 U	NA	2,000 U	2,200 U	250 U	238 U	238 U	250 U	630 U	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	250 U	238 U	238 U	250 U	630 U	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	250 U	238 U	238 U	250 U	630 U	NA	NA	NA	NA	NA

B - Not detected above associated blank

I - Ether interference

J - Estimated

K - May be biased high

L - May be biased low

N - Tentative identification

NA - Not analyzed

R - Unreliable result

U - Not detected

Table A-1
Inlet Sediment Analytical Results
Site 2
St. Juliens Annex, Chesapeake, Virginia

Station ID Sample ID Sample Date	SJS02-SD01 SJS02-SD01-000 07/14/97	SJS02-SD02 SJS02-SD02-000 07/14/97	SJS02-SD03		SJS02-SD04 SJS02-SD04-001 04/16/99	SJS02-SD05 SJS02-SD05-001 04/16/99	SJS02-SD06 SJS02-SD06-001 04/16/99	SJS02-SD07 SJS02-SD07-001 04/16/99	SJS02-SD09 SJS02-SD09 07/18/01	SJS02-SD10 SJS02-SD10 07/18/01	SJS02-SD11 SJS02-SD11 07/18/01	SJS02-SD12 SJS02-SD12 07/18/01	SJS02-SD13 SJS02-SD13 07/18/01	SJS02-SD14 SJS02-SD14 07/18/01
Chemical Name														
2-Amino-4,6-dinitrotoluene	540 U	NA	2,000 U	2,200 U	250 U	238 U	238 U	250 U	630 U	NA	NA	NA	NA	NA
2-Nitrotoluene	540 U	NA	2,000 U	2,200 U	500 U	476 U	476 U	500 U	630 U	NA	NA	NA	NA	NA
3-Nitrotoluene	540 U	NA	2,000 U	2,200 U	500 U	476 U	476 U	500 U	630 U	NA	NA	NA	NA	NA
4-Amino-2,6-dinitrotoluene	540 U	NA	2,000 U	2,200 U	250 U	238 U	238 U	250 U	630 U	NA	NA	NA	NA	NA
4-Nitrotoluene	540 U	NA	2,000 U	2,200 U	500 U	476 U	476 U	500 U	630 U	NA	NA	NA	NA	NA
HMX	540 U	NA	2,000 U	2,200 U	500 U	476 U	476 U	500 U	630 U	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	250 U	238 U	238 U	250 U	630 U	NA	NA	NA	NA	NA
RDX	540 U	NA	2,000 U	2,200 U	500 U	476 U	476 U	500 U	630 U	NA	NA	NA	NA	NA
Tetryl	540 U	NA	2,000 U	2,200 U	500 U	476 U	476 U	500 U	630 U	NA	NA	NA	NA	NA
Inorganics (MG/KG)														
Aluminum	3,100	10,900	27,200	25,900	1,500	9,360	9,600	20,200	2,850	NA	NA	NA	NA	NA
Antimony	0.42 UL	3.3 B	16.3 L	27.6 L	0.400 UL	1.20 L	1.80 L	1.70 L	2.4	NA	NA	NA	NA	NA
Arsenic	2.3	5.4 K	13.1	19.4	1.60 K	7.5 K	9.60 K	12 K	4	NA	NA	NA	NA	NA
Barium	15.4 J	55.7 J	84.7 J	109 J	4.10 J	102	89.3	79.4 J	81.2	NA	NA	NA	NA	NA
Beryllium	0.21 U	1.1 B	0.87 J	1.1 J	0.0700 J	0.590 J	0.620 J	0.900 J	0.3	NA	NA	NA	NA	NA
Cadmium	0.14 J	4	2.5 J	2.1 J	0.530 J	8.20	7.30	4.60	9.2	NA	NA	NA	NA	NA
Calcium	393 J	2,300 J	24,300 J	11,600 J	207 J	6,230	4,300	2,390 J	4,580	NA	NA	NA	NA	NA
Chromium	6.5	277	1,640	2,630	11.6	1,180	1,900	392	55.9	NA	NA	NA	NA	NA
Cobalt	1.67 U	4.06 U	9.1 J	10.7 J	0.660 J	5.10 J	6 J	7.80 J	4.3	NA	NA	NA	NA	NA
Copper	4.4 J	344	1,700	2,620	18.2	1,200	2,030	494	160	NA	NA	NA	NA	NA
Cyanide	0.54 U	1.4 U	2.1 U	2 U	0.584	0.417 U	0.524 U	0.549 U	NA	NA	NA	NA	NA	NA
Iron	3,150	18,500	31,100	30,700	2,050	12,700	18,100	28,000	6,470	NA	NA	NA	NA	NA
Lead	15.5	161	396	545	14.9	312	366	250	211	NA	NA	NA	NA	NA
Magnesium	309 J	4,710	6,890 J	6,480 J	364 J	3,710	2,950	4,970	1,370	NA	NA	NA	NA	NA
Manganese	16 K	105	235	224	8.30 K	174 K	204 K	148 K	125	NA	NA	NA	NA	NA
Mercury	0.05 U	0.45	0.72	0.79	0.0400 J	0.620	0.470	0.690	0.39	NA	NA	NA	NA	NA
Nickel	1.8 B	16.4 K	41.5	40.9	2 J	32.6	35.9	29.1	8.3	NA	NA	NA	NA	NA
Potassium	228 J	2,000 J	3,830	3,380 J	207 J	1,270 J	1,280	3,050	403	NA	NA	NA	NA	NA
Selenium	0.63 UL	1.52 U	2.27 U	2.22 U	0.390 U	0.770 U	0.710 K	1.5 K	1.3 U	NA	NA	NA	NA	NA
Silver	0.21 U	0.51 U	1.8 B	1.5 B	0.130 U	0.680 J	0.770 J	0.870 J	1.3 U	NA	NA	NA	NA	NA
Sodium	33.7 B	11,800	17,800	16,300	1,040	3,830	4,820	9,550	144	NA	NA	NA	NA	NA
Thallium	0.42 U	1.02 U	1.52 U	2.2 K	0.480 U	0.950 U	0.760 U	1.70 U	1.5 U	NA	NA	NA	NA	NA
Vanadium	7.2 J	28.8	115	97.9	5 J	53	96.5	62.7	14.9	NA	NA	NA	NA	NA
Zinc	19.2	416	1,140 L	1,400 L	42.8	888	1,120	539	405	NA	NA	NA	NA	NA
Wet Chemistry														
% Solids	NA	NA	NA	NA	70.5	50.4	44.2	35.6	NA	NA	NA	NA	NA	NA
Phosphorus (MG/KG)	10.5	13.5	19.1	20.2	102	370	177	164	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC) (MG/KG)	2,050	44,000	71,000 L	64,600 L	2,270	41,900	35,000	57,200	NA	NA	NA	NA	NA	NA
pH	NA	NA	NA	NA	7.49	7.45	7.39	7.20	NA	NA	NA	NA	NA	NA

Shaded cells indicate analyte detections

B - Not detected above associated blank

I - Ether interference

J - Estimated

K - May be biased high

L - May be biased low

N - Tentative identification

NA - Not analyzed

R - Unreliable result

U - Not detected

Table A-2
Outfall Transect Sediment Analytical Results
Site 2
St. Juliens Annex, Chesapeake, Virginia

Station ID Sample ID Sample Date	SJS02-SD08 SJS02-SD08-001 04/14/99	SJS02-SD08-002 10/27/99	SJS02-SD15 SJS02-SD15-00-04A 01/06/04	SJS02-SD16 SJS02-SD16-00-04A-P 01/06/04	SJS02-SD16-00-04A 01/06/04	SJS02-SD17 SJS02-SD17-00-04A 01/06/04	SJS02-SD18 SJS02-SD18-00-04A 01/06/04	SJS02-SD19 SJS02-SD19-00-04A 01/06/04	SJS02-SD20 SJS02-SD20-00-04A 01/06/04
Chemical Name									
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene (total)	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
2-Butanone	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Acetone	16 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Bromoform	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Bromomethane	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	16 UJ	4 J	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Chloroethane	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Chloroform	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Chloromethane	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	17 B	81 B	NA	NA	NA	NA	NA	NA	NA
Styrene	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Toluene	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	10 J	18 U	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Xylene, total	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
trans-1,3-Dichloropropene	16 U	18 U	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)									
1,1-Biphenyl	NA	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
1,2,4-Trichlorobenzene	550 UJ	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	550 UJ	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	550 UJ	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	550 UJ	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	1,400 UJ	NA	1,800 U	1,700 U	1,700 U	1,200 U	1,700 U	1,600 U	1,900 U
2,4,6-Trichlorophenol	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
2,4-Dichlorophenol	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
2,4-Dimethylphenol	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
2,4-Dinitrophenol	1,400 UJ	NA	1,800 U	1,700 U	1,700 U	1,200 U	1,700 U	1,600 U	1,900 U
2,4-Dinitrotoluene	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
2,6-Dinitrotoluene	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U

NA - Not analyzed

B - Analyte not detected above associated blank

J - Reported value is estimated

K - Reported value may be biased high

L - Reported value may be biased low

U - Analyte not detected

Table A-2
Outfall Transect Sediment Analytical Results
Site 2
St. Juliens Annex, Chesapeake, Virginia

Station ID Sample ID Sample Date	SJS02-SD08 SJS02-SD08-001 04/14/99		SJS02-SD15 SJS02-SD15-00-04A 01/06/04	SJS02-SD16 SJS02-SD16-00-04A-P 01/06/04		SJS02-SD17 SJS02-SD17-00-04A 01/06/04	SJS02-SD18 SJS02-SD18-00-04A 01/06/04	SJS02-SD19 SJS02-SD19-00-04A 01/06/04	SJS02-SD20 SJS02-SD20-00-04A 01/06/04
Chemical Name									
2-Chloronaphthalene	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
2-Chlorophenol	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
2-Methylnaphthalene	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
2-Methylphenol	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
2-Nitroaniline	1,400 UJ	NA	1,800 U	1,700 U	1,700 U	1,200 U	1,700 U	1,600 U	1,900 U
2-Nitrophenol	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
3,3'-Dichlorobenzidine	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
3-Nitroaniline	1,400 UJ	NA	1,800 U	1,700 U	1,700 U	1,200 U	1,700 U	1,600 U	1,900 U
4,6-Dinitro-2-methylphenol	1,400 UJ	NA	1,800 U	1,700 U	1,700 U	1,200 U	1,700 U	1,600 U	1,900 U
4-Bromophenyl-phenylether	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
4-Chloro-3-methylphenol	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
4-Chloroaniline	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
4-Chlorophenyl-phenylether	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
4-Methylphenol	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
4-Nitroaniline	1,400 UJ	NA	1,800 U	1,700 U	1,700 U	1,200 U	1,700 U	1,600 U	1,900 U
4-Nitrophenol	1,400 UJ	NA	1,800 U	1,700 U	1,700 U	1,200 U	1,700 U	1,600 U	1,900 U
Acenaphthene	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Acenaphthylene	550 UJ	NA	96 J	94 J	180 J	80 J	180 J	640 U	220 J
Acetophenone	NA	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Anthracene	550 UJ	NA	83 J	84 J	140 J	81 J	120 J	640 U	410 J
Atrazine	NA	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Benzaldehyde	NA	NA	700 U	200 B	700 U	490 U	670 U	640 U	750 U
Benzo(a)anthracene	86 J	160 L	250 J	220 J	540 J	250 J	470 J	99 J	1,100
Benzo(a)pyrene	91 J	100 L	610 J	190 J	880	520	1,100	84 J	1,600
Benzo(b)fluoranthene	170 J	260 L	1,200	570 J	1,600	870	1,700	230 J	2,800
Benzo(g,h,i)perylene	83 J	130 L	700 U	690 U	88 J	280 J	560 J	640 U	760
Benzo(k)fluoranthene	77 J	130 L	340 J	210 J	630 J	340 J	580 J	78 J	970
Bis(2-chloro-1-methylethyl) ether	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Butylbenzylphthalate	550 UJ	NA	90 J	690 U	700 U	490 U	670 U	640 U	750 U
Caprolactam	NA	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Carbazole	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Chrysene	120 J	550 L	350 J	260 J	610 J	370 J	680	82 J	1,800
Di-n-butylphthalate	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Di-n-octylphthalate	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Dibenzo(a,h)anthracene	550 UJ	NA	120 J	690 U	210 J	100 J	190 J	640 U	290 J
Dibenzofuran	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Diethylphthalate	550 UJ	100 L	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Dimethyl phthalate	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Fluoranthene	150 J	240 L	440 J	330 J	860	350 J	700	130 J	2,300
Fluorene	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Hexachlorobenzene	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Hexachlorobutadiene	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Hexachlorocyclopentadiene	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Hexachloroethane	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Indeno(1,2,3-cd)pyrene	78 J	100 L	330 J	110 J	470 J	270 J	500 J	640 U	750
Isophorone	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Naphthalene	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Nitrobenzene	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U
Pentachlorophenol	1,400 UJ	NA	1,800 U	1,700 U	1,700 U	1,200 U	1,700 U	1,600 U	1,900 U

NA - Not analyzed

B - Analyte not detected above associated blank

J - Reported value is estimated

K - Reported value may be biased high

L - Reported value may be biased low

U - Analyte not detected

Table A-2
Outfall Transect Sediment Analytical Results
Site 2
St. Juliens Annex, Chesapeake, Virginia

Station ID Sample ID Sample Date	SJS02-SD08 SJS02-SD08-001 04/14/99	SJS02-SD08-002 10/27/99	SJS02-SD15 SJS02-SD15-00-04A 01/06/04	SJS02-SD16 SJS02-SD16-00-04A-P 01/06/04		SJS02-SD16-00-04A 01/06/04	SJS02-SD17 SJS02-SD17-00-04A 01/06/04	SJS02-SD18 SJS02-SD18-00-04A 01/06/04	SJS02-SD19 SJS02-SD19-00-04A 01/06/04	SJS02-SD20 SJS02-SD20-00-04A 01/06/04
Chemical Name										
Phenanthrene	550 UJ	160 L	700 U	690 U	110 J	57 J	76 J	640 U	190 J	
Phenol	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U	
Pyrene	130 J	230 L	580 J	320 J	1,100	460 J	890	120 J	1,800	
bis(2-Chloroethoxy)methane	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U	
bis(2-Chloroethyl)ether	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U	
bis(2-Ethylhexyl)phthalate	550 UJ	110 L	5,900	620 B	1,600	250 B	1,900	95 B	110 B	
n-Nitroso-di-n-propylamine	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U	
n-Nitrosodiphenylamine	550 UJ	NA	700 U	690 U	700 U	490 U	670 U	640 U	750 U	
Pesticides/Polychlorinated Biphenyls (UG/KG)										
4,4'-DDD	12 J	91 L	7 U	6.9 U	7 U	22	10	6.4 U	93	
4,4'-DDE	3.80 J	NA	7 U	6.9 U	7 U	9.2 J	6.5 J	6.4 U	200 J	
4,4'-DDT	3.40 J	NA	7 U	6.9 U	7 U	3 J	6.7 U	6.4 U	11 J	
Aldrin	2.70 UJ	NA	3.6 U	3.5 U	3.6 U	2.5 U	3.4 U	3.3 U	3.9 U	
Aroclor-1016	54 UJ	NA	70 U	69 U	70 U	49 U	67 U	64 U	75 U	
Aroclor-1221	110 UJ	NA	140 U	140 U	140 U	99 U	140 U	130 U	150 U	
Aroclor-1232	54 UJ	NA	70 U	69 U	70 U	49 U	67 U	64 U	75 U	
Aroclor-1242	54 UJ	NA	70 U	69 U	70 U	49 U	67 U	64 U	75 U	
Aroclor-1248	54 UJ	NA	70 U	69 U	70 U	49 U	67 U	64 U	75 U	
Aroclor-1254	54 UJ	NA	70 U	69 U	70 U	49 U	67 U	64 U	75 U	
Aroclor-1260	54 UJ	NA	70 U	69 U	70 U	49 U	67 U	64 U	75 U	
Dieldrin	5.40 UJ	NA	7 U	6.9 U	7 U	4.9 U	6.7 U	6.4 U	7.5 U	
Endosulfan I	2.70 UJ	NA	3.6 U	3.5 U	3.6 U	2.5 U	3.4 U	3.3 U	3.9 U	
Endosulfan II	5.40 UJ	NA	7 U	6.9 U	7 U	4.9 U	6.7 U	6.4 U	7.5 U	
Endosulfan sulfate	5.40 UJ	NA	7 U	6.9 U	7 U	4.9 U	6.7 U	6.4 U	7.5 U	
Endrin	5.40 UJ	NA	7 U	6.9 U	7 U	4.9 U	6.7 U	6.4 U	7.5 U	
Endrin aldehyde	5.40 UJ	NA	7 U	6.9 U	7 U	4.9 U	6.7 U	6.4 U	7.5 U	
Endrin ketone	5.40 UJ	NA	7 U	6.9 U	7 U	4.9 U	6.7 U	6.4 U	7.5 U	
Heptachlor	2.70 UJ	NA	3.6 U	3.5 U	3.6 U	2.5 U	3.4 U	3.3 U	3.9 U	
Heptachlor epoxide	2.70 UJ	NA	3.6 U	3.5 U	3.6 U	2.5 U	3.4 U	3.3 U	3.9 U	
Methoxychlor	27 UJ	NA	36 U	35 U	36 U	25 U	34 U	33 U	39 U	
Toxaphene	270 UJ	NA	360 U	350 U	360 U	250 U	340 U	330 U	390 U	
alpha-BHC	2.70 UJ	NA	3.6 U	3.5 U	3.6 U	2.5 U	3.4 U	3.3 U	3.9 U	
alpha-Chlordane	0.820 J	NA	3.6 U	3.5 U	3.6 U	1.6 J	3.4 U	3.3 U	6.7 J	
beta-BHC	2.70 UJ	NA	3.6 U	3.5 U	3.6 U	2.5 U	3.4 U	3.3 U	3.9 U	
delta-BHC	2.70 UJ	NA	3.6 U	3.5 U	3.6 U	2.5 U	3.4 U	3.3 U	3.9 U	
gamma-BHC (Lindane)	2.70 UJ	NA	3.6 U	3.5 U	3.6 U	2.5 U	3.4 U	3.3 U	3.9 U	
gamma-Chlordane	1.5 J	NA	3.6 U	3.5 U	3.6 U	2.1 J	3.4 U	3.3 U	19 J	
Explosives (UG/KG)										
1,3,5-Trinitrobenzene	250 U	240 U	NA	NA	NA	NA	NA	NA	NA	
1,3-Dinitrobenzene	250 U	240 U	NA	NA	NA	NA	NA	NA	NA	
2,4,6-Trinitrotoluene	250 U	240 U	NA	NA	NA	NA	NA	NA	NA	
2,4-Dinitrotoluene	250 U	240 U	NA	NA	NA	NA	NA	NA	NA	
2,6-Dinitrotoluene	250 U	240 U	NA	NA	NA	NA	NA	NA	NA	
2-Amino-4,6-dinitrotoluene	250 U	240 U	NA	NA	NA	NA	NA	NA	NA	
2-Nitrotoluene	500 U	480 U	NA	NA	NA	NA	NA	NA	NA	
3-Nitrotoluene	500 U	480 U	NA	NA	NA	NA	NA	NA	NA	
4-Amino-2,6-dinitrotoluene	250 U	240 U	NA	NA	NA	NA	NA	NA	NA	

NA - Not analyzed

B - Analyte not detected above associated blank

J - Reported value is estimated

K - Reported value may be biased high

L - Reported value may be biased low

U - Analyte not detected

Table A-2
Outfall Transect Sediment Analytical Results
Site 2
St. Juliens Annex, Chesapeake, Virginia

Station ID Sample ID Sample Date	SJS02-SD08 SJS02-SD08-001 04/14/99	SJS02-SD08-002 10/27/99	SJS02-SD15 SJS02-SD15-00-04A 01/06/04	SJS02-SD16 SJS02-SD16-00-04A-P 01/06/04	SJS02-SD16-00-04A 01/06/04	SJS02-SD17 SJS02-SD17-00-04A 01/06/04	SJS02-SD18 SJS02-SD18-00-04A 01/06/04	SJS02-SD19 SJS02-SD19-00-04A 01/06/04	SJS02-SD20 SJS02-SD20-00-04A 01/06/04
Chemical Name									
4-Nitrotoluene	500 U	480 U	NA	NA	NA	NA	NA	NA	NA
HMX	500 U	480 U	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	250 U	240 U	NA	NA	NA	NA	NA	NA	NA
RDX	500 U	480 U	NA	NA	NA	NA	NA	NA	NA
Tetryl	500 U	480 U	NA	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)									
Aluminum	4,100	5,020	16,600	16,200	19,600	6,540	15,700	18,600	17,600
Antimony	0.650 U	0.75 U	0.8 UL	0.69 UL	0.73 UL	0.58 UL	0.7 UL	0.76 UL	0.75 UL
Arsenic	3.5	4.7	13.7	14.2	13.7	5.4	13.4	7.6	10.4
Barium	15.2 J	26 J	38.5 J	38.2 J	43.8 J	21.6 J	35.6 J	40 J	68.5 J
Beryllium	0.300 J	0.370 J	0.7 J	0.73 J	0.83 J	0.32 J	0.69 J	0.74 J	0.83 J
Cadmium	1.10 J	1.5	0.08 U	0.069 U	0.073 U	0.78 J	0.14 J	0.076 U	4.5
Calcium	1,640	1,100 J	1,920 J	2,010	222	1,210 J	3,920	1,890 J	4,380
Chromium	67.1	84.1	32.5	32.8	36.7	61.8	47.6	30.1	443
Cobalt	2.40 J	2.80 J	6.6 J	6.7 J	7.9 J	3.1 J	6.2 J	6.9 J	8.7 J
Copper	94.8	115	92.6 K	47.8 K	35 K	111 K	79.6 K	10.1 K	461 K
Cyanide	1.80 L	0.400 U	0.86 J	0.29 U	0.27 U	0.22 J	0.26 U	0.32 J	3
Iron	8,630	9,520	28,000	29,200	33,500	11,900	27,900	28,900	28,100
Lead	54.2	64.8	83.1	77	58.1	65.4	98.8	16.8	219
Magnesium	1,680	2,090	5,310	5,490	6,640	2,280	5,060	6,010	5,110
Manganese	51.6	58.2	178	181	223	77.8	165	211	181
Mercury	0.220	0.25	0.6	0.39	0.46	0.29	0.6	0.085 U	0.46
Nickel	7.10 J	8.60 J	13.6 J	14 J	16.7	8.5 J	14.4	14.6 J	20
Potassium	734 J	744 J	2,900	2,850	3,580	1,100 J	2,690	3,390	2,880
Selenium	0.630 U	0.840 U	0.8 U	0.69 U	0.73 U	0.58 U	0.7 U	0.76 U	0.75 U
Silver	0.220 U	0.25 J	1.4 J	1.5 J	1.6 J	0.71 J	1.5 J	1.3 J	1.8 J
Sodium	3,280	2,320	6,690	7,000	7,610	3,100	6,930	6,850	6,910
Thallium	0.770 U	1.40 U	0.8 U	0.69 U	0.73 U	0.58 U	0.7 U	0.76 U	0.75 U
Vanadium	12.4	14.4	34.3	30.9	37.3	17.2	30.6	35.2	37
Zinc	173	203	249 K	173 K	144 K	225 K	251 K	61.6 K	609 K
Wet Chemistry									
% Solids	61.2	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC) (MG/KG)	24,400	NA	63,000	35,000	37,000	15,000	34,000	32,000	32,000
pH	7.37	NA	NA	NA	NA	NA	NA	NA	NA

Shaded cells indicate analyte detections

NA - Not analyzed

B - Analyte not detected above associated blank

J - Reported value is estimated

K - Reported value may be biased high

L - Reported value may be biased low

U - Analyte not detected

Table A-3
Reference and Background Sediment Analytical Results
St. Juliens Creek
St. Juliens Annex, Chesapeake, Virginia

Station ID Sample ID Sample Date	SJREF-SD01 SJREF-SD01-00-04A 01/06/04	SJREF-SD02 SJREF-SD02-00-04A 01/06/04	SJREF-SD03 SJREF-SD03-00-04A 01/06/04		SJREF-SD04 SJREF-SD04-00-04A 01/06/04	SJREF-SD05 SJREF-SD05-00-04A 01/06/04	SJSBK-SD01 SJSBK-SD01-001 04/14/99		SJSBK-SD02 SJSBK-SD02-001 04/14/99		SJSBK SJSBK-SD03-001 04/14/99						
Chemical Name																	
Volatile Organic Compounds (UG/KG)																	
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
1,2-Dichloroethane	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
1,2-Dichloroethene (total)	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
1,2-Dichloropropane	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
2-Butanone	NA	NA	NA	NA	NA	NA	15 U	10 J	18 U	10 J	14 U						
2-Hexanone	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
4-Methyl-2-pentanone	NA	NA	NA	NA	NA	NA	3 J	15 U	4 J	27 U	14 U						
Acetone	NA	NA	NA	NA	NA	NA	15 U	15 B	18 U	27 B	14 U						
Benzene	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
Bromodichloromethane	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
Bromoform	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
Bromomethane	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
Carbon disulfide	NA	NA	NA	NA	NA	NA	15 B	2 J	18 B	6 J	14 U						
Carbon tetrachloride	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
Chlorobenzene	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
Chloroethane	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
Chloroform	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
Chloromethane	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
Dibromochloromethane	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
Ethylbenzene	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
Methylene chloride	NA	NA	NA	NA	NA	NA	15 B	15 B	18 B	27 B	14 B						
Styrene	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
Tetrachloroethene	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
Toluene	NA	NA	NA	NA	NA	NA	15 U	3 J	18 U	27 U	14 U						
Trichloroethene	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
Vinyl chloride	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
Xylene, total	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
cis-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
trans-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	15 U	15 U	18 U	27 U	14 U						
Semivolatile Organic Compounds (UG/KG)																	
1,1-Biphenyl	870 U	680 U	720 U	730 U	750 U	750 U	NA	NA	NA	NA	NA						
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	490 U	NA	610 U	NA	480 U						
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	490 U	NA	610 U	NA	480 U						
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	490 U	NA	610 U	NA	480 U						
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	490 U	NA	610 U	NA	480 U						
2,4,5-Trichlorophenol	2,200 U	1,700 U	1,800 U	1,800 U	1,900 U	1,900 U	1,200 U	1,200 U	1,500 U	2,200 U	1,200 U						
2,4,6-Trichlorophenol	870 U	680 U	720 U	730 U	750 U	750 U	490 U	490 U	610 U	880 U	480 U						
2,4-Dichlorophenol	870 U	680 U	720 U	730 U	750 U	750 U	490 U	490 U	610 U	880 U	480 U						
2,4-Dimethylphenol	870 U	680 U	720 U	730 U	750 U	750 U	490 U	490 U	610 U	880 U	480 U						
2,4-Dinitrophenol	2,200 U	1,700 U	1,800 U	1,800 U	1,900 U	1,900 U	1,200 U	1,200 U	1,500 U	2,200 U	1,200 U						
2,4-Dinitrotoluene	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U						
2,6-Dinitrotoluene	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U						

NA - Not analyzed

B - Analyte not detected above associated blank

J - Reported value is estimated

K - Reported value may be biased high

L - Reported value may be biased low

R - Unreliable result

U - Analyte not detected

Table A-3
Reference and Background Sediment Analytical Results
St. Juliens Creek
St. Juliens Annex, Chesapeake, Virginia

Station ID Sample ID Sample Date	SJREF-SD01 SJREF-SD01-00-04A 01/06/04	SJREF-SD02 SJREF-SD02-00-04A 01/06/04	SJREF-SD03 SJREF-SD03-00-04A 01/06/04		SJREF-SD04 SJREF-SD04-00-04A 01/06/04	SJREF-SD05 SJREF-SD05-00-04A 01/06/04	SJSBK-SD01 SJSBK-SD01-001 04/14/99		SJSBK-SD02 SJSBK-SD02-001 04/14/99		SJSBK SJSBK-SD03-001 04/14/99
Chemical Name											
2-Chloronaphthalene	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
2-Chlorophenol	870 U	680 U	720 U	730 U	750 U	750 U	490 U	490 U	610 U	880 U	480 U
2-Methylnaphthalene	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
2-Methylphenol	870 U	680 U	720 U	730 U	750 U	750 U	490 U	490 U	610 U	880 U	480 U
2-Nitroaniline	2,200 U	1,700 U	1,800 U	1,800 U	1,900 U	1,900 U	1,200 U	NA	1,500 U	NA	1,200 U
2-Nitrophenol	870 U	680 U	720 U	730 U	750 U	750 U	490 U	490 U	610 U	880 U	480 U
3,3'-Dichlorobenzidine	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
3-Nitroaniline	2,200 U	1,700 U	1,800 U	1,800 U	1,900 U	1,900 U	1,200 U	NA	1,500 U	NA	1,200 U
4,6-Dinitro-2-methylphenol	2,200 U	1,700 U	1,800 U	1,800 U	1,900 U	1,900 U	1,200 U	1,200 U	1,500 U	2,200 U	1,200 U
4-Bromophenyl-phenylether	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
4-Chloro-3-methylphenol	870 U	680 U	720 U	730 U	750 U	750 U	490 U	490 U	610 U	880 U	480 U
4-Chloroaniline	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
4-Chlorophenyl-phenylether	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
4-Methylphenol	870 U	680 U	720 U	730 U	750 U	750 U	490 U	490 U	610 U	880 U	480 U
4-Nitroaniline	2,200 U	1,700 U	1,800 U	1,800 U	1,900 U	1,900 U	1,200 U	NA	1,500 U	NA	1,200 U
4-Nitrophenol	2,200 U	1,700 U	1,800 U	1,800 U	1,900 U	1,900 U	1,200 U	1,200 U	1,500 U	2,200 U	1,200 U
Acenaphthene	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Acenaphthylene	310 J	680 U	110 J	130 J	750 U	120 J	490 U	NA	610 U	NA	480 U
Acetophenone	870 U	680 U	720 U	730 U	750 U	750 U	NA	NA	NA	NA	NA
Anthracene	290 J	680 U	89 J	110 J	750 U	99 J	490 U	NA	610 U	170 L	480 U
Atrazine	870 U	680 U	720 U	730 U	750 U	750 U	NA	NA	NA	NA	NA
Benzaldehyde	870 U	680 U	720 U	730 U	750 U	750 U	NA	NA	NA	NA	NA
Benzo(a)anthracene	950	260 J	370 J	580 J	110 J	380 J	490 U	NA	300 J	1,300 L	54 J
Benzo(a)pyrene	430 J	170 J	360 J	970	280 J	810	490 U	NA	270 J	1,100 L	480 U
Benzo(b)fluoranthene	3,300	670 J	1,200	1,600	420 J	1,400	490 U	100 L	500 J	NA	77 J
Benzo(g,h,i)perylene	870 U	680 U	720 U	470 J	140 J	400 J	490 U	NA	190 J	550 L	480 U
Benzo(k)fluoranthene	1,400	260 J	450 J	520 J	130 J	460 J	490 U	NA	160 J	580 L	480 U
Bis(2-chloro-1-methylethyl) ether	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Butylbenzylphthalate	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Caprolactam	870 U	680 U	720 U	730 U	750 U	750 U	NA	NA	NA	NA	NA
Carbazole	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Chrysene	1,200	280 J	500 J	700 J	170 J	540 J	490 U	71 L	360 J	1,500 L	67 J
Di-n-butylphthalate	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Di-n-octylphthalate	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Dibenz(a,h)anthracene	410 J	680 U	140 J	190 J	750 U	170 J	490 U	NA	67 J	NA	480 U
Dibenzofuran	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Diethylphthalate	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Dimethyl phthalate	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Fluoranthene	1,600	460 J	630 J	1,000	190 J	620 J	490 U	69 L	560 J	2,600 L	91 J
Fluorene	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Hexachlorobenzene	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Hexachlorobutadiene	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Hexachlorocyclopentadiene	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Hexachloroethane	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Indeno(1,2,3-cd)pyrene	320 J	110 J	260 J	480 J	150 J	390 J	490 U	NA	170 J	510 L	480 U
Isophorone	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	880 U	480 U
Naphthalene	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Nitrobenzene	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Pentachlorophenol	2,200 U	1,700 U	1,800 U	1,800 U	1,900 U	1,900 U	1,200 U	1,200 U	1,500 U	2,200 U	1,200 U

NA - Not analyzed

B - Analyte not detected above associated blank

J - Reported value is estimated

K - Reported value may be biased high

L - Reported value may be biased low

R - Unreliable result

U - Analyte not detected

Table A-3
Reference and Background Sediment Analytical Results
St. Juliens Creek
St. Juliens Annex, Chesapeake, Virginia

Station ID Sample ID Sample Date	SJREF-SD01 SJREF-SD01-00-04A 01/06/04	SJREF-SD02 SJREF-SD02-00-04A 01/06/04	SJREF-SD03 SJREF-SD03-00-04A 01/06/04		SJREF-SD04 SJREF-SD04-00-04A 01/06/04	SJREF-SD05 SJREF-SD05-00-04A 01/06/04	SJSBK-SD01 SJSBK-SD01-001 04/14/99		SJSBK-SD02 SJSBK-SD02-001 04/14/99		SJSBK SJSBK-SD03-001 04/14/99
Chemical Name											
Phenanthrene	130 J	120 J	720 U	90 J	750 U	750 U	490 U	NA	220 J	420 L	480 U
Phenol	870 U	680 U	720 U	730 U	750 U	750 U	490 U	490 U	610 U	880 U	480 U
Pyrene	570 J	250 J	460 J	840	240 J	620 J	490 U	65 L	440 J	1,900 L	76 J
bis(2-Chloroethoxy)methane	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
bis(2-Chloroethyl)ether	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
bis(2-Ethylhexyl)phthalate	140 B	87 B	110 B	140 B	510 B	110 B	490 U	NA	610 U	120 L	480 U
n-Nitroso-di-n-propylamine	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
n-Nitrosodiphenylamine	870 U	680 U	720 U	730 U	750 U	750 U	490 U	NA	610 U	NA	480 U
Pesticides/Polychlorinated Biphenyls (UG/KG)											
4,4'-DDD	8.6 U	6.8 U	7.2 U	7.3 U	7.5 U	2.9 J	4.90 B	7.20 L	6 B	39 L	4.70 B
4,4'-DDE	8.6 U	6.8 U	5.1 J	7.3 U	7.5 U	4 J	4.90 B	16 L	6 B	12 L	4.70 B
4,4'-DDT	8.6 U	6.8 U	7.2 U	7.3 U	7.5 U	7.5 U	4.90 UU	12 L	6 UJ	13 L	4.70 UU
Aldrin	4.4 U	3.5 U	3.7 U	3.7 U	3.9 U	3.9 U	2.5 U	NA	3 U	NA	2.40 U
Aroclor-1016	86 U	68 U	72 U	73 U	75 U	75 U	49 U	NA	60 U	NA	47 U
Aroclor-1221	170 U	140 U	150 U	150 U	150 U	150 U	99 U	NA	120 U	NA	95 U
Aroclor-1232	86 U	68 U	72 U	73 U	75 U	75 U	49 U	NA	60 U	NA	47 U
Aroclor-1242	86 U	68 U	72 U	73 U	75 U	75 U	49 U	NA	60 U	NA	47 U
Aroclor-1248	86 U	68 U	72 U	73 U	75 U	75 U	49 U	NA	60 U	NA	47 U
Aroclor-1254	86 U	68 U	72 U	73 U	75 U	75 U	49 U	NA	60 U	NA	47 U
Aroclor-1260	86 U	68 U	72 U	73 U	75 U	75 U	49 U	NA	60 U	NA	47 U
Dieldrin	8.6 U	6.8 U	7.2 U	7.3 U	7.5 U	7.5 U	4.90 U	NA	6 U	NA	4.70 U
Endosulfan I	4.4 U	3.5 U	3.7 U	3.7 U	3.9 U	3.9 U	2.5 U	NA	3 U	NA	2.40 U
Endosulfan II	8.6 U	6.8 U	7.2 U	7.3 U	7.5 U	7.5 U	4.90 U	NA	6 U	NA	4.70 U
Endosulfan sulfate	8.6 U	6.8 U	7.2 U	7.3 U	7.5 U	7.5 U	4.90 U	NA	6 U	NA	4.70 U
Endrin	8.6 U	6.8 U	7.2 U	7.3 U	7.5 U	7.5 U	4.90 U	NA	6 U	NA	4.70 U
Endrin aldehyde	8.6 U	6.8 U	7.2 U	7.3 U	7.5 U	7.5 U	4.90 U	NA	6 U	NA	4.70 U
Endrin ketone	8.6 U	6.8 U	7.2 U	7.3 U	7.5 U	7.5 U	4.90 U	NA	6 U	NA	4.70 U
Heptachlor	4.4 U	3.5 U	3.7 U	3.7 U	3.9 U	3.9 U	2.5 U	NA	3 U	NA	2.40 U
Heptachlor epoxide	4.4 U	3.5 U	3.7 U	3.7 U	3.9 U	3.9 U	2.5 U	NA	3 U	NA	2.40 U
Methoxychlor	300	35 U	37 U	170	39 U	60	25 U	NA	30 U	NA	24 U
Toxaphene	440 U	350 U	370 U	370 U	390 U	390 U	250 U	NA	300 U	NA	240 U
alpha-BHC	4.4 U	3.5 U	3.7 U	3.7 U	3.9 U	3.9 U	2.5 U	NA	3 U	NA	2.40 U
alpha-Chlordane	4.4 U	3.5 U	3.7 U	3.7 U	3.9 U	3.9 U	2.5 U	NA	3 U	NA	2.40 U
beta-BHC	4.4 U	3.5 U	3.7 U	3.7 U	3.9 U	3.9 U	2.5 U	NA	3 U	NA	2.40 U
delta-BHC	4.4 U	3.5 U	3.7 U	3.7 U	3.9 U	3.9 U	2.5 U	NA	3 U	NA	2.40 U
gamma-BHC (Lindane)	4.4 U	3.5 U	3.7 U	3.7 U	3.9 U	3.9 U	2.5 U	NA	3 U	NA	2.40 U
gamma-Chlordane	4.4 U	3.5 U	3.7 U	3.7 U	3.9 U	3.9 U	2.5 U	NA	3 U	NA	2.40 U
Inorganics (MG/KG)											
Aluminum	20,700	20,500	17,300	19,200	17,400	18,000	4,660 K	2,310	7,890 K	7,380	1,620 K
Antimony	0.92 UL	0.72 UL	0.72 UL	0.79 UL	0.75 UL	0.83 UL	0.470 U	0.430 B	0.700 U	0.770 UL	0.75 U
Arsenic	15.4	12.1	12.8	13.1	9.1	15	3.70	2.10	6.20	7.80	1.10 J
Barium	48.6 J	41.7 J	39.3 J	42 J	36.8 J	40.4 J	15.4 J	6.5 J	27.1 J	34.6 J	4.60 J
Beryllium	0.89 J	0.76 J	0.77 J	0.78 J	0.72 J	0.78 J	0.310 J	0.150 J	0.440 J	0.550 J	0.100 J
Cadmium	0.17 J	0.072 U	0.11 J	0.079 U	0.075 U	0.083 U	0.410 J	0.170 J	1 J	1.10 J	0.220 J
Calcium	2,520	2,920	2,040	2,120	4,370	2,280	879	446 J	1,520	1,820	304 L
Chromium	39.9	32.2	32.5	32.6	30	32.4	14	8.20 K	42.4	43.2 K	4.60
Cobalt	8.1 J	7.7 J	6.8 J	6.6 J	6.7 J	6.6 J	2.5 J	1.10 J	3.80 J	4 J	0.960 J

NA - Not analyzed

B - Analyte not detected above associated blank

J - Reported value is estimated

K - Reported value may be biased high

L - Reported value may be biased low

R - Unreliable result

U - Analyte not detected

Table A-3
Reference and Background Sediment Analytical Results
St. Juliens Creek
St. Juliens Annex, Chesapeake, Virginia

Station ID Sample ID Sample Date	SJREF-SD01 SJREF-SD01-00-04A 01/06/04	SJREF-SD02 SJREF-SD02-00-04A 01/06/04	SJREF-SD03 SJREF-SD03-00-04A 01/06/04		SJREF-SD04 SJREF-SD04-00-04A 01/06/04	SJREF-SD05 SJREF-SD05-00-04A 01/06/04	SJSBK-SD01 SJSBK-SD01-001 04/14/99		SJSBK-SD02 SJSBK-SD02-001 04/14/99		SJSBK SJSBK-SD03-001 04/14/99
Chemical Name											
Copper	70.1 K	24.2 K	55.2 K	47.4 K	26.1 K	48.9 K	29.3	15.7	86.2	122	11.9
Cyanide	0.38 U	0.28 U	0.3 U	2	0.33 U	4.5	0.360 B	0.330 U	0.400 B	0.610 U	0.240 B
Iron	32,700	31,300	27,700	28,300	27,600	27,600	8,140 K	3,860	14,800 K	16,700	3,050
Lead	85.9	47.8	77.6	80.6	31	78.1	37 K	20.6 K	60.6 K	75.9 K	13.9 K
Magnesium	6,380	6,360	5,340	5,590	5,870	5,340	1,510	758 J	2,390	2,920	562 J
Manganese	202	219	165	161	194	160	48.1	20.8 K	84.6	89.8 K	15.5
Mercury	0.74	0.12 J	0.55	0.6	0.21	0.61	0.0300 L	0.0600	0.270 L	0.370	0.0400 L
Nickel	17.8 J	15.9	15.1	15.1 J	15.3	14.5 J	6 J	2.70 J	10.4	11.3	1.90 J
Potassium	3,490	3,580	2,840	2,950	3,190	2,940	795 L	341 J	1,180 L	1,210 J	297 L
Selenium	0.92 U	0.72 U	0.72 U	0.79 U	0.75 U	0.83 U	0.450 U	0.470 U	0.740 J	1.30 J	0.720 U
Silver	1.8 J	1.6 J	1.5 J	1.5 J	1.4 J	1.5 J	0.160 U	0.110 U	0.230 U	0.190 U	0.25 U
Sodium	9,410	7,070	7,380	7,770	7,440	6,530	4,720	1,390 K	5,450	4,910	1,550 L
Thallium	0.92 U	0.72 U	0.72 U	0.79 U	0.75 U	0.83 U	0.550 UL	0.800 U	0.830 UL	1.40 U	0.890 U
Vanadium	38	38.7	31.6	33.1	33.9	33.7	13.3	6.20 J	21.2	19.9	5 J
Zinc	254 K	110 K	218 K	184 K	116 K	191 K	125	65.2 K	195	281 K	45.7
Wet Chemistry											
% Solids	NA	NA	NA	NA	NA	NA	67.6	68.4	55.2	37.5	70
Total organic carbon (TOC) (MG/KG)	41,000	61,000	31,000	43,000	34,000	39,000	2,860	12,300	2,340	63,300	8,380
pH	NA	NA	NA	NA	NA	NA	7.11	7.17	7.19	7.17	7.45

Shaded cells indicate analyte detections

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Table A-3
Reference and Background Sediment Analytical Results
St. Juliens Creek
St. Juliens Annex, Chesapeake, Virginia

Station ID	-SD03	SJSBK-SD04-001	SJSBK-SD04-002	SJSBK-SD04-002P	SJSBK-SD05-001	SJSBK-SD05-002	SJSBK-SD06-001	SJSBK-SD06-002	SJSBK-SD12-001
Sample ID	SJSBK-SD03-002	10/27/99	04/14/99	12/05/99	04/14/99	10/26/99	04/14/99	10/26/99	SJSBK-SD12-001
Sample Date									10/27/99
Chemical Name									
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
1,1,2,2-Tetrachloroethane	15 U	13 U	NA	NA	32 UJ	26 U	15 UU	13 U	16 U
1,1,2-Trichloroethane	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
1,1-Dichloroethane	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
1,1-Dichloroethene	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
1,2-Dichloroethane	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
1,2-Dichloroethene (total)	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
1,2-Dichloropropane	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
2-Butanone	15 U	13 U	NA	NA	32 UJ	93 J	15 U	5 J	12 J
2-Hexanone	15 U	13 U	NA	NA	32 UJ	26 U	15 UU	13 U	16 U
4-Methyl-2-pentanone	15 U	5 J	NA	NA	8 J	26 U	7 J	13 U	16 U
Acetone	157	13 U	340 J	340 J	32 J	240 J	15 U	13 B	16 B
Benzene	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
Bromodichloromethane	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
Bromoform	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
Bromomethane	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
Carbon disulfide	15 U	13 U	5 J	5 J	32 UJ	5 J	15 U	13 U	3 J
Carbon tetrachloride	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
Chlorobenzene	15 U	13 U	NA	NA	32 UJ	26 U	15 UU	13 U	16 U
Chloroethane	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
Chloroform	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
Chlormethane	15 U	13 U	NA	NA	32 U	9 J	15 U	2 J	16 U
Dibromochloromethane	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
Ethylbenzene	15 U	13 U	NA	NA	32 UJ	26 U	15 UU	13 U	16 U
Methylene chloride	15 B	13 B	NA	170 B	32 B	26 B	15 B	13 B	16 B
Styrene	15 U	13 U	NA	NA	32 UJ	26 U	15 UU	13 U	16 U
Tetrachloroethene	15 U	13 U	NA	NA	32 UJ	26 U	15 UU	13 U	16 U
Toluene	15 U	13 U	NA	NA	32 UJ	5 J	15 UJ	2 J	2 J
Trichloroethene	15 U	13 B	NA	NA	32 UJ	26 U	15 U	13 U	16 U
Vinyl chloride	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
Xylene, total	15 U	13 U	NA	NA	32 UJ	26 U	15 UU	13 U	16 U
cis-1,3-Dichloropropene	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
trans-1,3-Dichloropropene	15 U	13 U	NA	NA	32 UJ	26 U	15 U	13 U	16 U
Semivolatile Organic Compounds (UG/KG)									
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
1,2-Dichlorobenzene	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
1,3-Dichlorobenzene	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
1,4-Dichlorobenzene	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
2,4,5-Trichlorophenol	1,200 U	2,200 R	NA	NA	13,000 R	NA	1,200 U	1,100 U	NA
2,4,6-Trichlorophenol	500 U	880 R	NA	NA	5,400 R	NA	490 U	430 U	NA
2,4-Dichlorophenol	500 U	880 R	NA	NA	5,400 R	NA	490 U	430 U	NA
2,4-Dimethylphenol	500 U	880 R	NA	NA	5,400 R	NA	490 U	430 U	NA
2,4-Dinitrophenol	1,200 U	2,200 R	NA	NA	13,000 R	NA	1,200 U	1,100 U	NA
2,4-Dinitrotoluene	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
2,6-Dinitrotoluene	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA

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Table A-3
Reference and Background Sediment Analytical Results
St. Juliens Creek
St. Juliens Annex, Chesapeake, Virginia

Station ID	-SD03	SJSBK-SD04-001	SJSBK-SD04-002	SJSBK-SD04-002P	SJSBK-SD05-001	SJSBK-SD05-002	SJSBK-SD06-001	SJSBK-SD06-002	SJSBK-SD12
Sample ID	SJSBK-SD03-002	10/27/99	04/14/99	12/05/99	04/14/99	10/26/99	04/14/99	10/26/99	SJSBK-SD12-001
Sample Date									10/27/99
Chemical Name									
2-Chloronaphthalene	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
2-Chlorophenol	500 U	880 R	NA	NA	5,400 R	NA	490 U	430 U	NA
2-Methylnaphthalene	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
2-Methylphenol	500 U	880 R	NA	NA	5,400 R	NA	490 U	430 U	NA
2-Nitroaniline	NA	2,200 R	NA	NA	13,000 R	NA	1,200 U	NA	NA
2-Nitrophenol	500 U	880 R	NA	NA	5,400 R	NA	490 U	430 U	NA
3,3'-Dichlorobenzidine	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
3-Nitroaniline	NA	2,200 R	NA	NA	13,000 R	NA	1,200 U	NA	NA
4,6-Dinitro-2-methylphenol	1,200 U	2,200 R	NA	NA	13,000 R	NA	1,200 U	1,100 U	NA
4-Bromophenyl-phenylether	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
4-Chloro-3-methylphenol	500 U	880 R	NA	NA	5,400 R	NA	490 U	430 U	NA
4-Chloroaniline	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
4-Chlorophenyl-phenylether	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
4-Methylphenol	500 U	880 R	NA	NA	5,400 R	NA	490 U	430 U	NA
4-Nitroaniline	NA	2,200 R	NA	NA	13,000 R	NA	1,200 U	NA	NA
4-Nitrophenol	1,200 U	2,200 R	NA	NA	13,000 R	NA	1,200 U	1,100 U	NA
Acenaphthene	NA	880 R	71 J	71 J	5,400 R	NA	490 U	NA	NA
Acenaphthylene	NA	880 R	NA	NA	5,400 R	NA	490 U	61 L	NA
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	880 R	120 J	120 J	5,400 R	NA	490 U	45 L	NA
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	92 L	130 R	800	800	5,400 R	NA	67 J	210 L	130 L
Benzo(a)pyrene	69 L	91 R	480 J	480 J	5,400 R	NA	50 J	110 L	80 L
Benzo(b)fluoranthene	130 L	160 R	870	870	5,400 R	NA	74 J	260 L	320 L
Benzo(g,h,i)perylene	NA	880 R	290 J	290 J	5,400 R	NA	490 U	170 L	130 L
Benzo(k)fluoranthene	59 L	880 R	210 J	210 J	5,400 R	NA	490 U	130 L	120 L
Bis(2-chloro-1-methylethyl) ether	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
Butylbenzylphthalate	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	880 R	79 J	79 J	5,400 R	NA	490 U	48 L	NA
Chrysene	120 L	110 R	880	880	5,400 R	NA	62 J	210 L	210 L
Di-n-butylphthalate	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
Di-n-octylphthalate	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
Dibenzo(a,h)anthracene	NA	880 R	NA	NA	5,400 R	NA	490 U	50 L	NA
Dibenzofuran	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
Diethylphthalate	NA	4,700 R	NA	NA	17,000 R	NA	490 U	50 L	220 L
Dimethyl phthalate	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
Fluoranthene	190 L	170 R	1,600	1,600	5,400 R	NA	160 J	450 L	300 L
Fluorene	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
Hexachlorobenzene	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
Hexachlorobutadiene	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
Hexachlorocyclopentadiene	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
Hexachloroethane	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
Indeno(1,2,3-cd)pyrene	53 L	880 R	260 J	260 J	5,400 R	NA	490 U	150 L	120 L
Isophorone	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
Naphthalene	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
Nitrobenzene	NA	880 R	NA	NA	5,400 R	NA	490 U	NA	NA
Pentachlorophenol	1,200 U	2,200 R	NA	NA	13,000 R	NA	1,200 U	1,100 U	NA

NA - Not analyzed

B - Analyte not detected above associated blank

J - Reported value is estimated

K - Reported value may be biased high

L - Reported value may be biased low

R - Unreliable result

U - Analyte not detected

Table A-3
Reference and Background Sediment Analytical Results
St. Juliens Creek
St. Juliens Annex, Chesapeake, Virginia

Station ID	S-SD03	SJSBK-SD03-002	SJSBK-SD04-001	SJSBK-SD04	SJSBK-SD04-002	SJSBK-SD04-002P	SJSBK-SD05	SJSBK-SD05-001	SJSBK-SD05-002	SJSBK-SD06	SJSBK-SD06-001	SJSBK-SD06-002	SJSBK-SD12	SJSBK-SD12-001
Sample ID		10/27/99	04/14/99					04/14/99	10/26/99		04/14/99	10/26/99		
Sample Date														
Chemical Name														
Phenanthrene		NA	880 R		920		920	5,400 R		NA	110 J		310 L	62 L
Phenol		500 U	880 R		NA		NA	5,400 R		NA	490 U		430 U	NA
Pyrene		190 L	130 R		1,500		1,500	5,400 R		NA	110 J		340 L	260 L
bis(2-Chloroethoxy)methane		NA	880 R		NA		NA	5,400 R		NA	490 U		NA	NA
bis(2-Chloroethyl)ether		NA	880 R		NA		NA	5,400 R		NA	490 U		NA	NA
bis(2-Ethylhexyl)phthalate		NA	880 R		NA		NA	5,400 R		NA	150 J		44 J	NA
n-Nitroso-di-n-propylamine		NA	880 R		NA		NA	5,400 R		NA	490 U		NA	NA
n-Nitrosodiphenylamine		NA	880 R		NA		NA	5,400 R		NA	490 U		NA	NA
Pesticides/Polychlorinated Biphenyls (UG/KG)														
4,4'-DDD		3.20 L	4.40 B		12		12	92		8.80 L	4.90 B		2.60 L	16 L
4,4'-DDE		4.5 L	6.40		20		20	100		60 L	29		9 L	46 L
4,4'-DDT		1.80 L	1.30 J		9 J		9 J	6.40 J		9.10 L	5		5.60 L	NA
Aldrin		NA	2.20 U		NA		NA	5.30 U		NA	2.40 U		NA	NA
Aroclor-1016		NA	44 U		NA		NA	110 U		NA	49 U		NA	NA
Aroclor-1221		NA	87 U		NA		NA	210 U		NA	97 U		NA	NA
Aroclor-1232		NA	44 U		NA		NA	110 U		NA	49 U		NA	NA
Aroclor-1242		NA	44 U		NA		NA	110 U		NA	49 U		NA	NA
Aroclor-1248		NA	44 U		NA		NA	110 U		NA	49 U		NA	NA
Aroclor-1254		NA	44 U		NA		NA	110 U		NA	49 U		NA	NA
Aroclor-1260		NA	44 U		NA		NA	110 U		NA	49 U		NA	NA
Dieldrin		NA	4.40 U		NA		NA	11 U		NA	4.90 U		NA	NA
Endosulfan I		NA	2.20 U		NA		NA	5.30 U		NA	2.40 U		NA	NA
Endosulfan II		NA	4.40 U		NA		NA	11 U		NA	4.90 U		NA	NA
Endosulfan sulfate		NA	4.40 U		NA		NA	11 U		NA	4.90 U		NA	NA
Endrin		NA	4.40 U		NA		NA	11 U		NA	4.90 U		NA	NA
Endrin aldehyde		NA	4.40 U		NA		NA	11 U		NA	4.90 U		NA	NA
Endrin ketone		NA	4.40 U		NA		NA	11 U		NA	4.90 U		NA	NA
Heptachlor		NA	2.20 U		NA		NA	5.30 U		NA	2.40 U		NA	NA
Heptachlor epoxide		NA	2.20 U		NA		NA	5.30 U		NA	2.40 U		NA	NA
Methoxychlor		NA	22 U		NA		NA	53 U		NA	24 U		NA	NA
Toxaphene		NA	220 U		NA		NA	530 U		NA	240 U		NA	NA
alpha-BHC		NA	2.20 U		NA		NA	5.30 U		NA	2.40 U		NA	NA
alpha-Chlordane		NA	2.20 U		NA		NA	5.30 U		NA	2.40 U		NA	NA
beta-BHC		NA	2.20 U		NA		NA	5.30 U		NA	2.40 U		NA	NA
delta-BHC		NA	2.20 U		NA		NA	5.30 U		NA	2.40 U		NA	NA
gamma-BHC (Lindane)		NA	2.20 U		NA		NA	5.30 U		NA	2.40 U		NA	NA
gamma-Chlordane		NA	2.20 U		NA		NA	5.30 U		NA	2.40 U		NA	NA
Inorganics (MG/KG)														
Aluminum		2,670	1,400 K		2,550		2,400	14,100 K		6,020	1,520 K		469	5,510
Antimony		0.670 UL	0.5 U		0.73 UL		NA	1.20 B		0.890 B	0.440 U		0.610 B	0.570 B
Arsenic		3.10	1.40 J		2.40 J		2.20 J	30.4		9.30	2.5		0.960 J	6.20
Barium		7.30 J	4.70 J		8.3 B		9.30 B	58.9 J		34.4 J	14.3 J		4 J	24.9 J
Beryllium		0.180 J	0.0900 J		0.210 J		0.210 J	2.10		0.5 J	0.160 J		0.0400 U	0.450 J
Cadmium		0.190 J	0.130 J		0.270 J		0.230 J	1.40 J		0.170 J	0.210 J		0.0800 J	0.390 J
Calcium		513 J	281 J		950 J		950 J	2,320		2,190	648 J		6.80 B	5,200
Chromium		6.90 K	3.10		7.40		6.80	20.2		9.90 K	3.10		0.990 K	20.7 K
Cobalt		1.20 J	0.75 J		0.880 J		0.840 J	9.5 J		1.40 J	0.0800 B		0.170 U	3.60 J

NA - Not analyzed

B - Analyte not detected above associated blank

J - Reported value is estimated

K - Reported value may be biased high

L - Reported value may be biased low

R - Unreliable result

U - Analyte not detected

Table A-3
Reference and Background Sediment Analytical Results
St. Juliens Creek
St. Juliens Annex, Chesapeake, Virginia

Station ID	S-SD03	SJSBK-SD04-001	SJSBK-SD04-002	SJSBK-SD04-002P	SJSBK-SD05-001	SJSBK-SD05-002	SJSBK-SD06-001	SJSBK-SD06-002	SJSBK-SD12-001
Sample ID	SJSBK-SD03-002	10/27/99	04/14/99	12/05/99	04/14/99	10/26/99	04/14/99	10/26/99	SJSBK-SD12-001
Sample Date									10/27/99
Chemical Name									
Copper	18.8	5.5	14.7	14.7	38.5	20.2	6.20	0.800 J	55.4
Cyanide	0.370 U	0.25 B	0.28 U	NA	0.670 B	0.630 U	0.300 B	0.320 U	0.370 U
Iron	4,850	2,200	3,640	3,330	18,500 K	4,720	1,660	599	12,000
Lead	19 K	8.20 K	23.2	23.2	104 K	73.8 K	12.8 K	3.70 K	66.5 K
Magnesium	934 J	319 J	739 J	739 J	1,630 J	1,200 J	108 J	5.70 B	2,840
Manganese	25.1 K	11.3	20.3	19.4	38.2	31.3 K	6.70	2.40 K	91.1 K
Mercury	0.0900	0.0700	1.40 L	0.990 L	0.270 L	0.160	0.0400 L	0.0200 U	0.200
Nickel	2.80 J	1.70 J	2.60 J	2.5 J	19.9	5.40 J	1.5 J	0.200 U	8.20
Potassium	419 J	170 L	261 J	250 J	684 L	467 J	104 L	44.9 J	846 J
Selenium	0.740 U	0.540 J	0.81 U	NA	1.5 J	1 J	0.430 U	0.670 U	0.630 U
Silver	0.170 U	0.170 U	0.18 U	NA	0.380 U	0.220 U	0.150 U	0.150 U	0.220 J
Sodium	1,670 K	652 J	1,050 B	1,310 B	1,930 J	893 J	36.7 J	44.3 B	2,640
Thallium	1.20 U	0.590 UL	1.4 U	NA	1.40 UL	1.60 U	0.520 UL	1.10 U	1.10 U
Vanadium	7.10 J	5 J	10 J	8.60 J	55.9	23.2	6.10 J	1.80 J	15.3
Zinc	66.9 K	30.3	54.2	48.7	422	96.2 K	38.8	0.150 B	191 K
Wet Chemistry									
% Solids	67.3	76.1	69.1	64.6	31	39.5	68	78	61.9
Total organic carbon (TOC) (MG/KG)	20,900	11,500	12,000	4,880	16,000	89,900	9,940	1,820	26,200
pH	6.77	7.35	7.65	7.65	6.97	6.60	6.03	6.5	7.82

Shaded cells indicate analyte detections

NA - Not analyzed

B - Analyte not detected above associated blank

J - Reported value is estimated

K - Reported value may be biased high

L - Reported value may be biased low

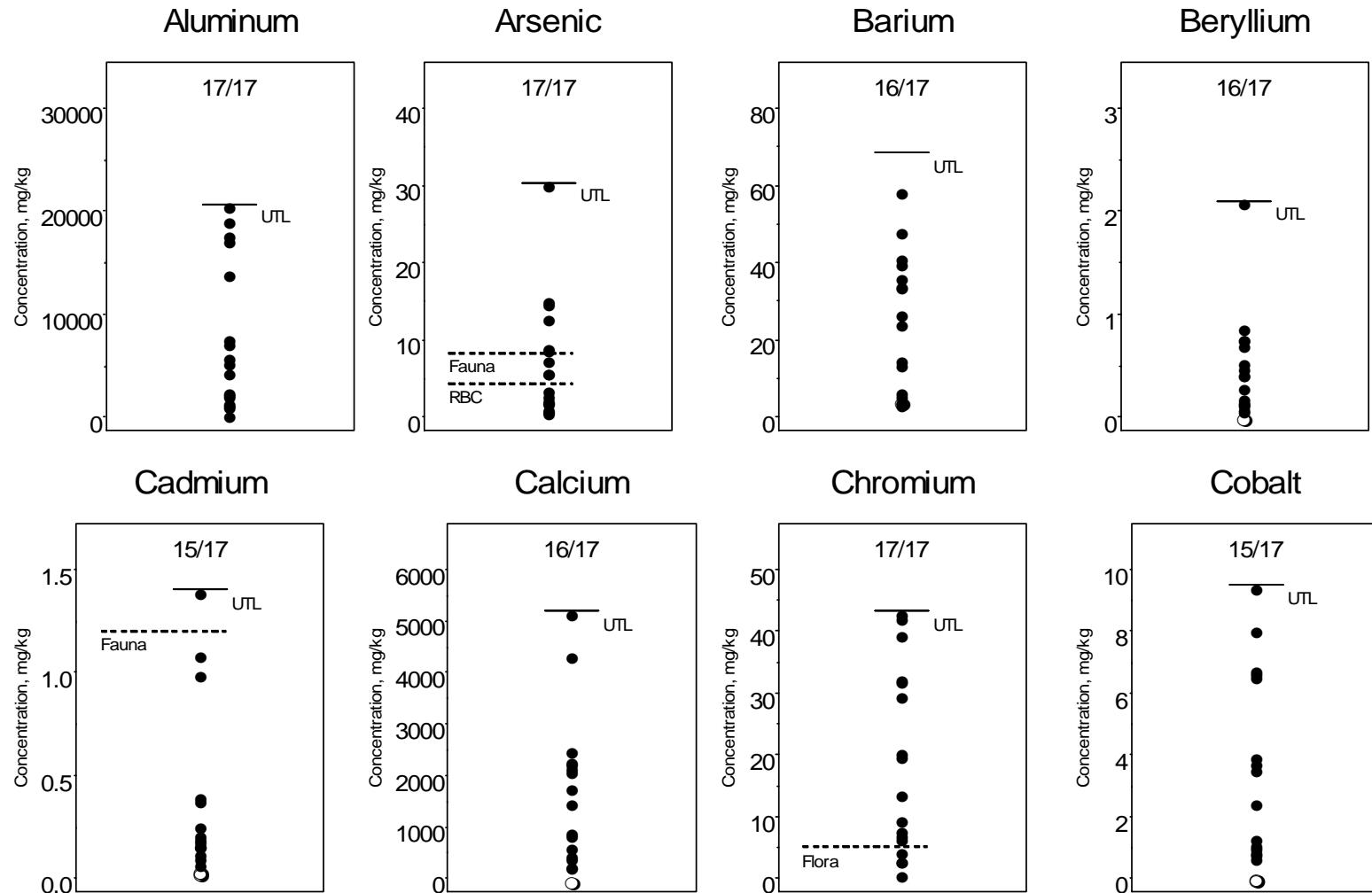
R - Unreliable result

U - Analyte not detected

Appendix B

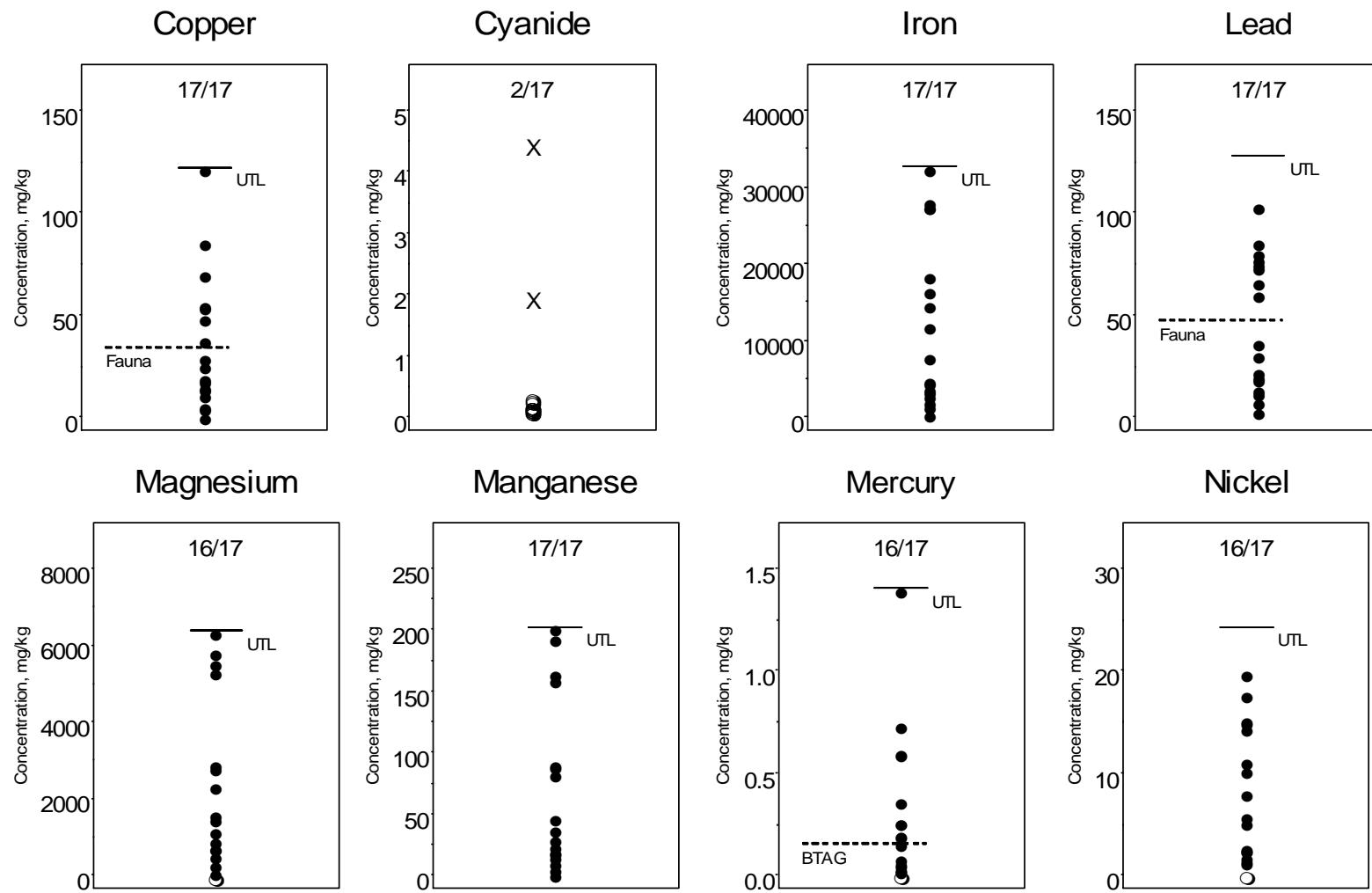
Statistical Plots

Figure 1: Scatter Plots for Detected Inorganics



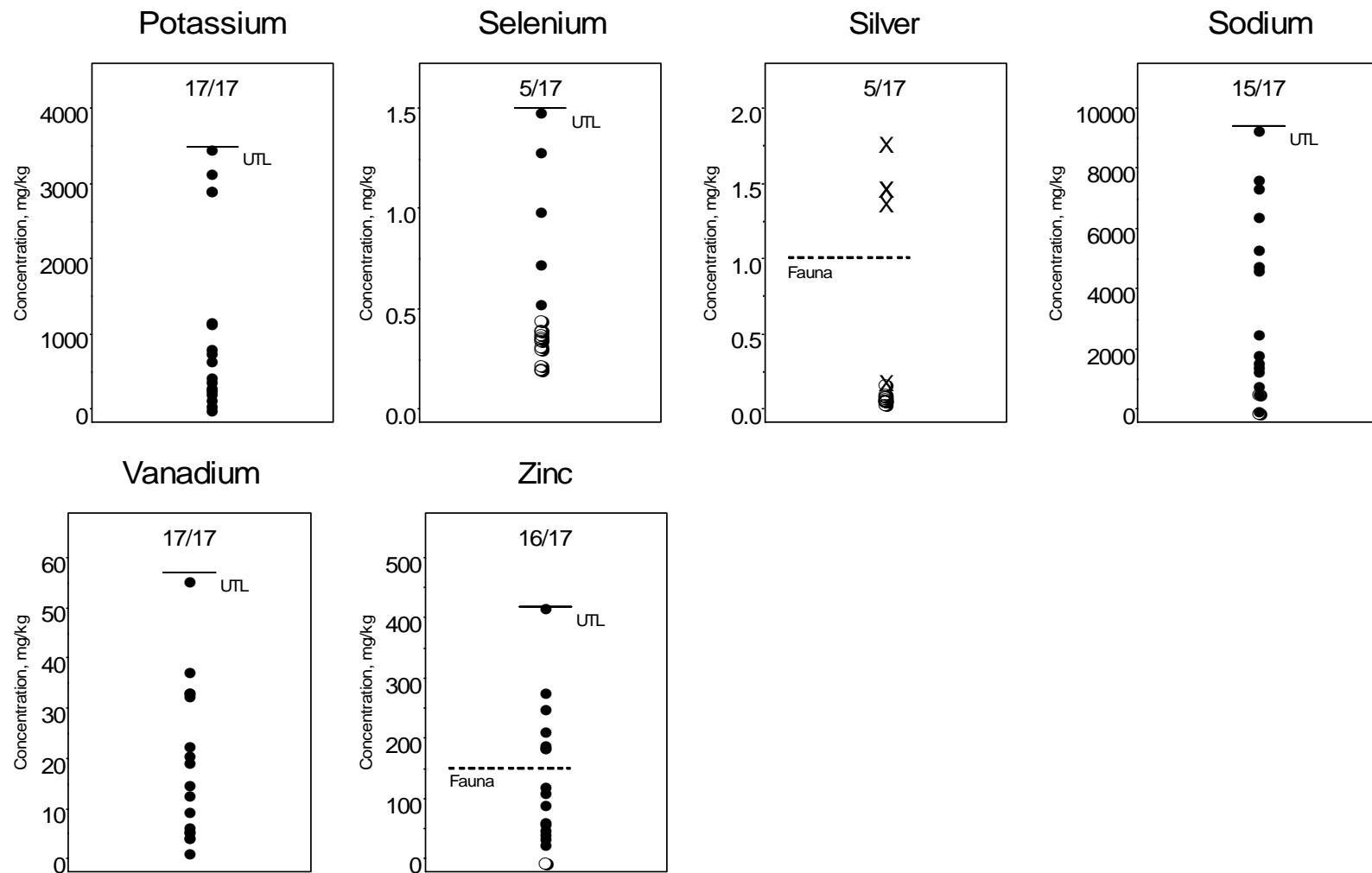
Open Symbol Represents Nondetected Value; Frequency of Detection Provided at Top of Plots
X represents calculated outlier (Xnd for non-detect proxy)

Figure 1: Scatter Plots for Detected Inorganics



Open Symbol Represents Nondetected Value; Frequency of Detection Provided at Top of Plots
X represents calculated outlier (Xnd for non-detect proxy)

Figure 1: Scatter Plots for Detected Inorganics



Open Symbol Represents Nondetected Value; Frequency of Detection Provided at Top of Plots
X represents calculated outlier (Xnd for non-detect proxy)

Figure 2: Scatter Plots for Detected Organics

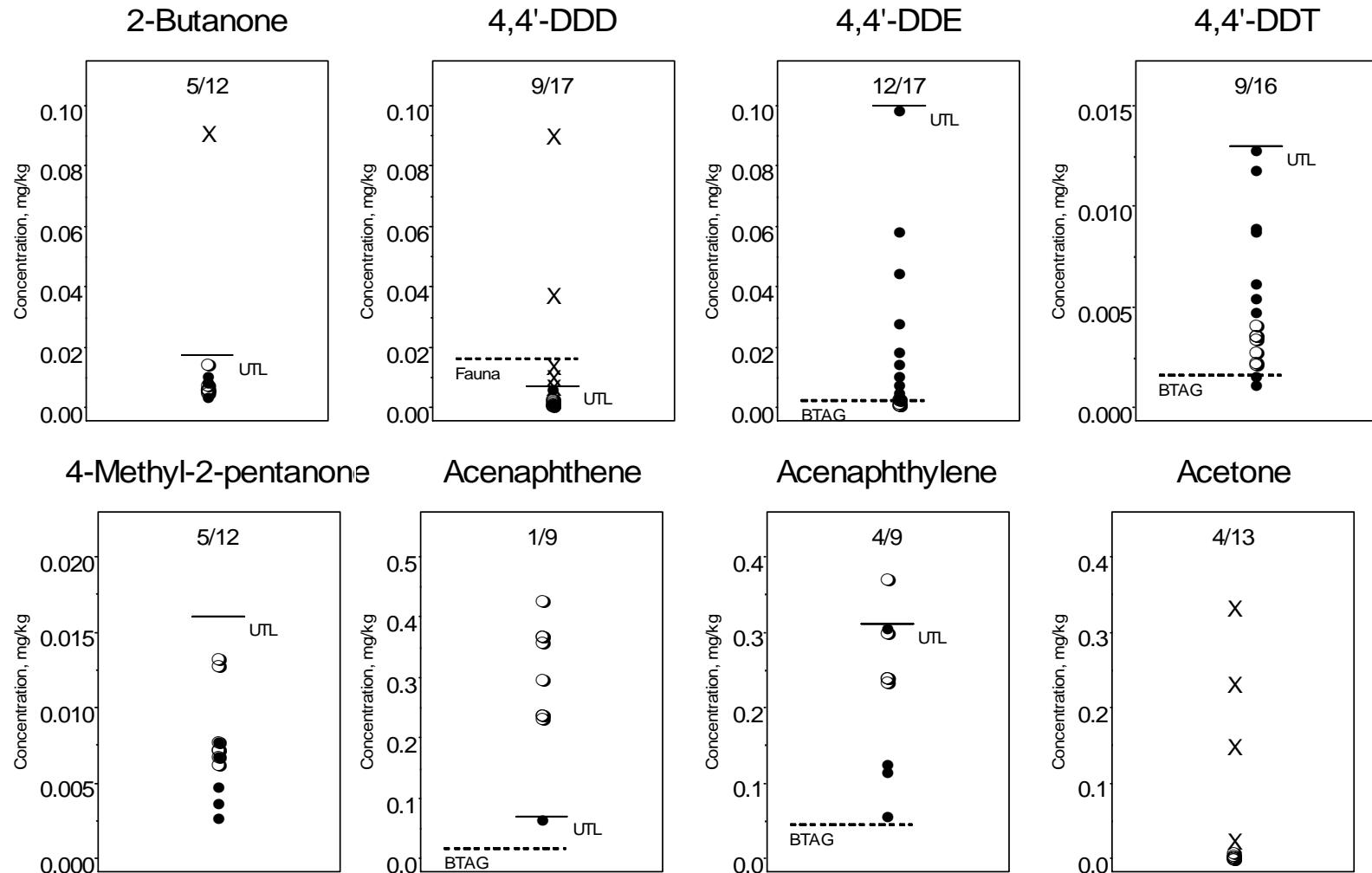
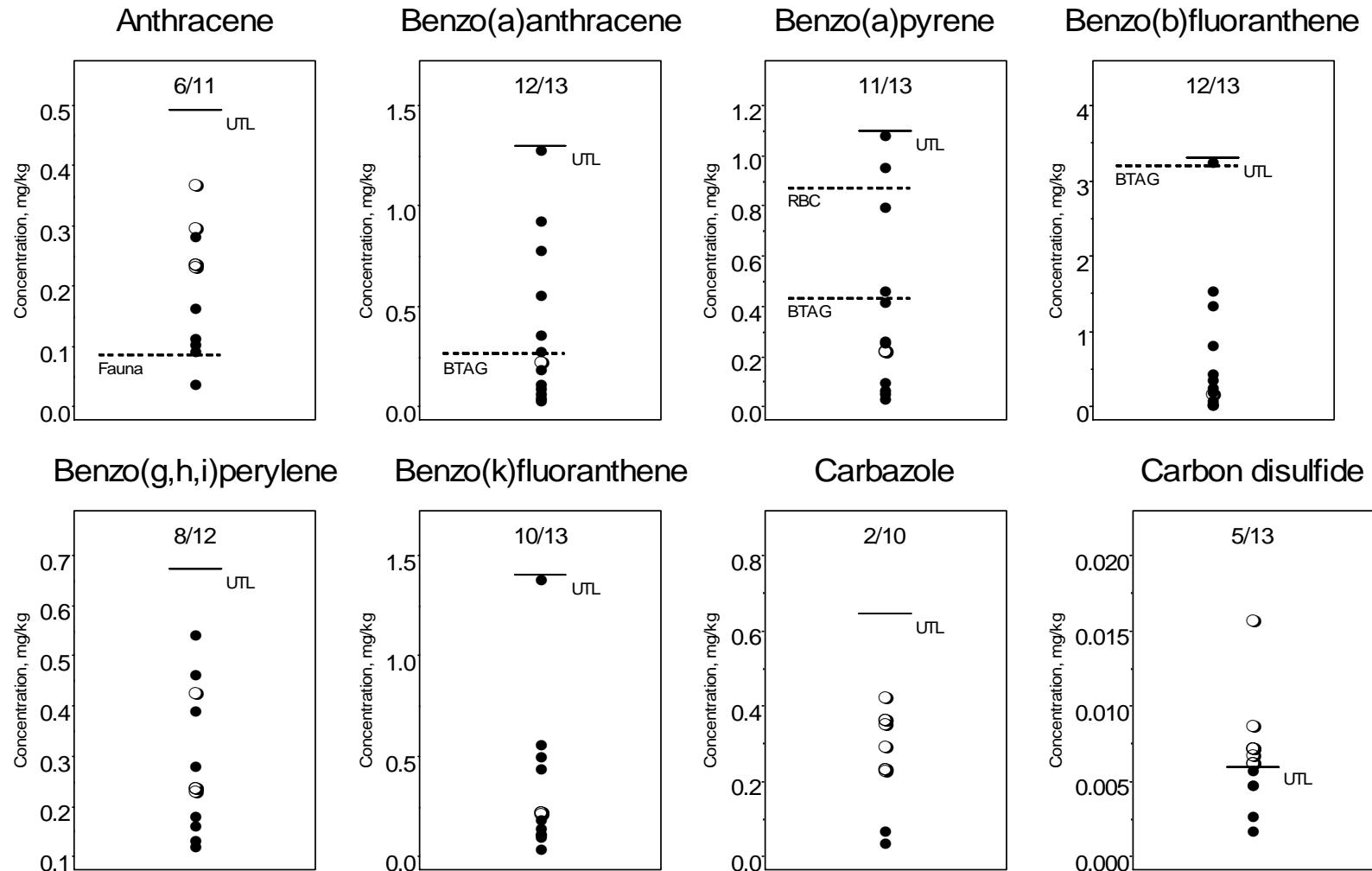
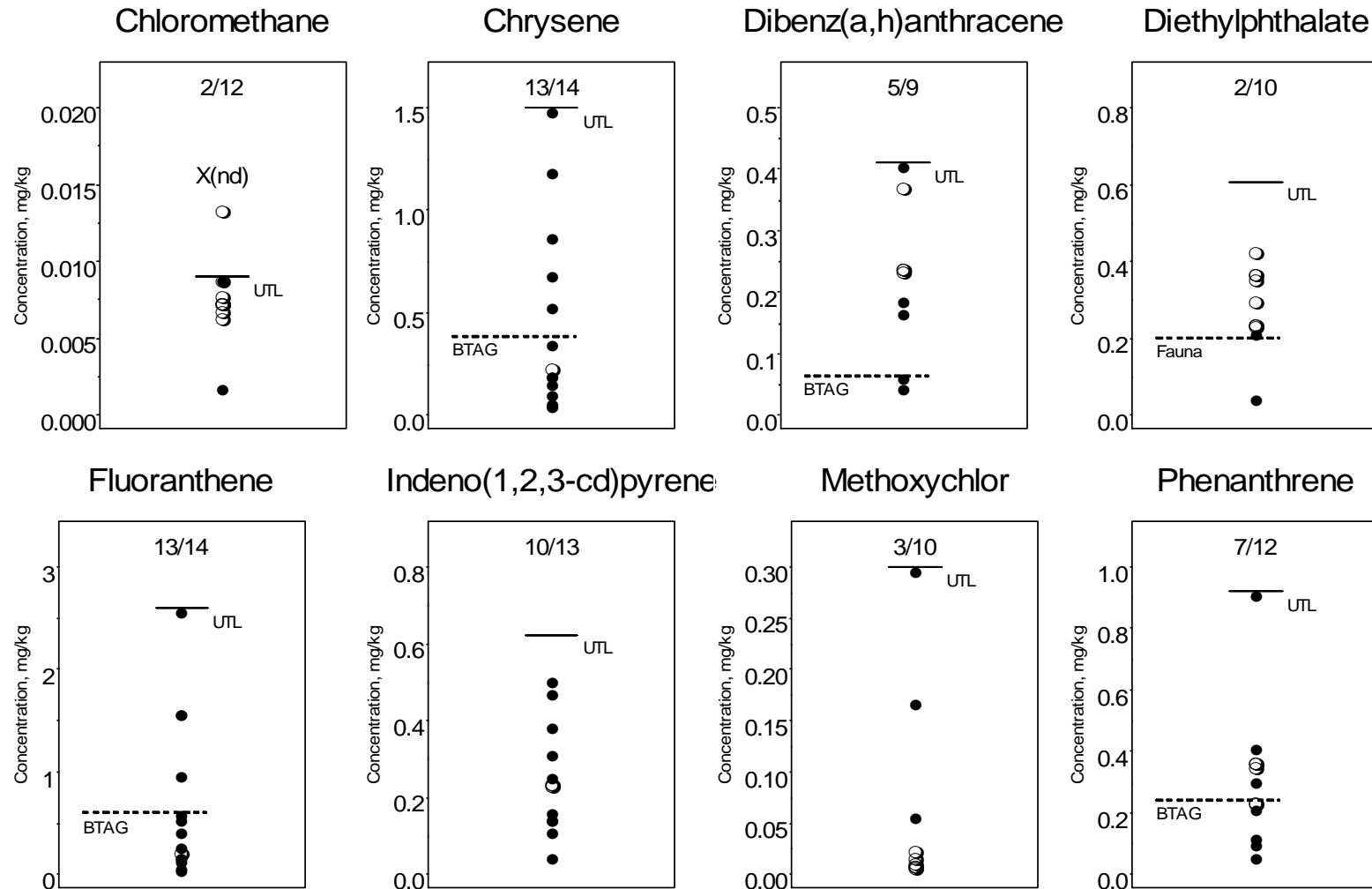


Figure 2: Scatter Plots for Detected Organics



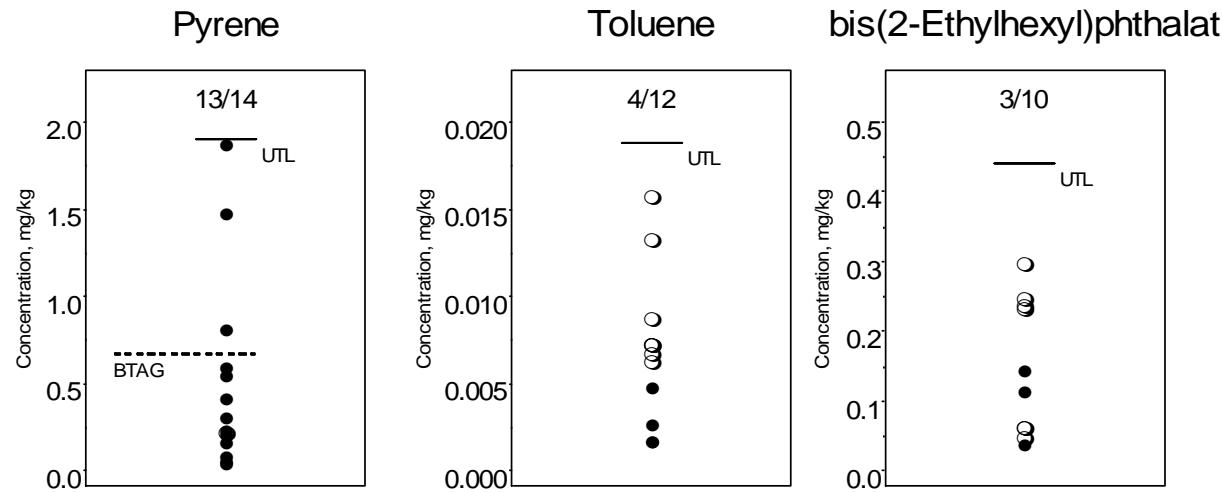
Open Symbol Represents Nondetected Value; Frequency of Detection Provided at Top of Plots
 X represents calculated outlier (Xnd for non-detect proxy)

Figure 2: Scatter Plots for Detected Organics



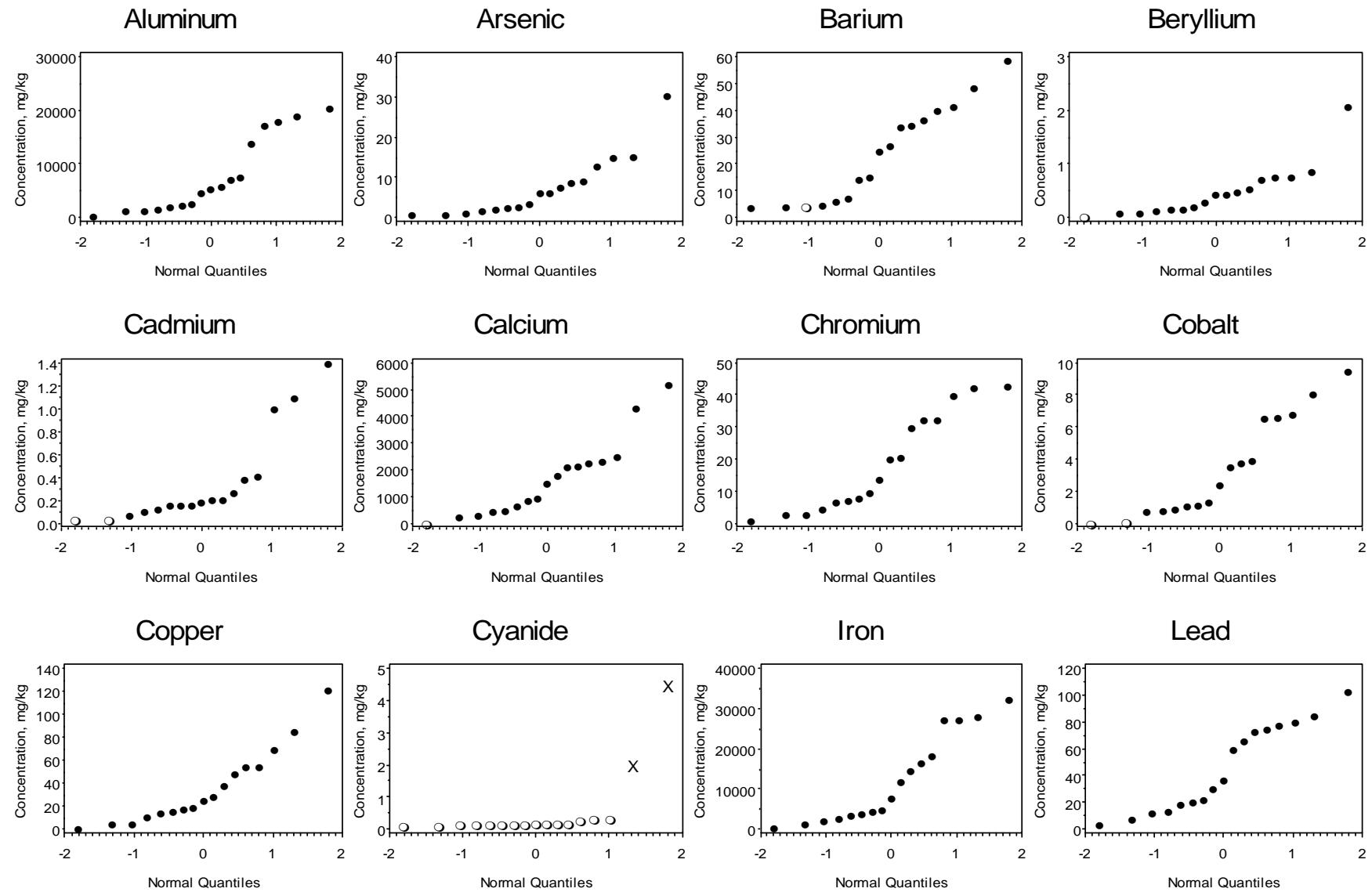
Open Symbol Represents Nondetected Value; Frequency of Detection Provided at Top of Plots
X represents calculated outlier (Xnd for non-detect proxy)

Figure 2: Scatter Plots for Detected Organics



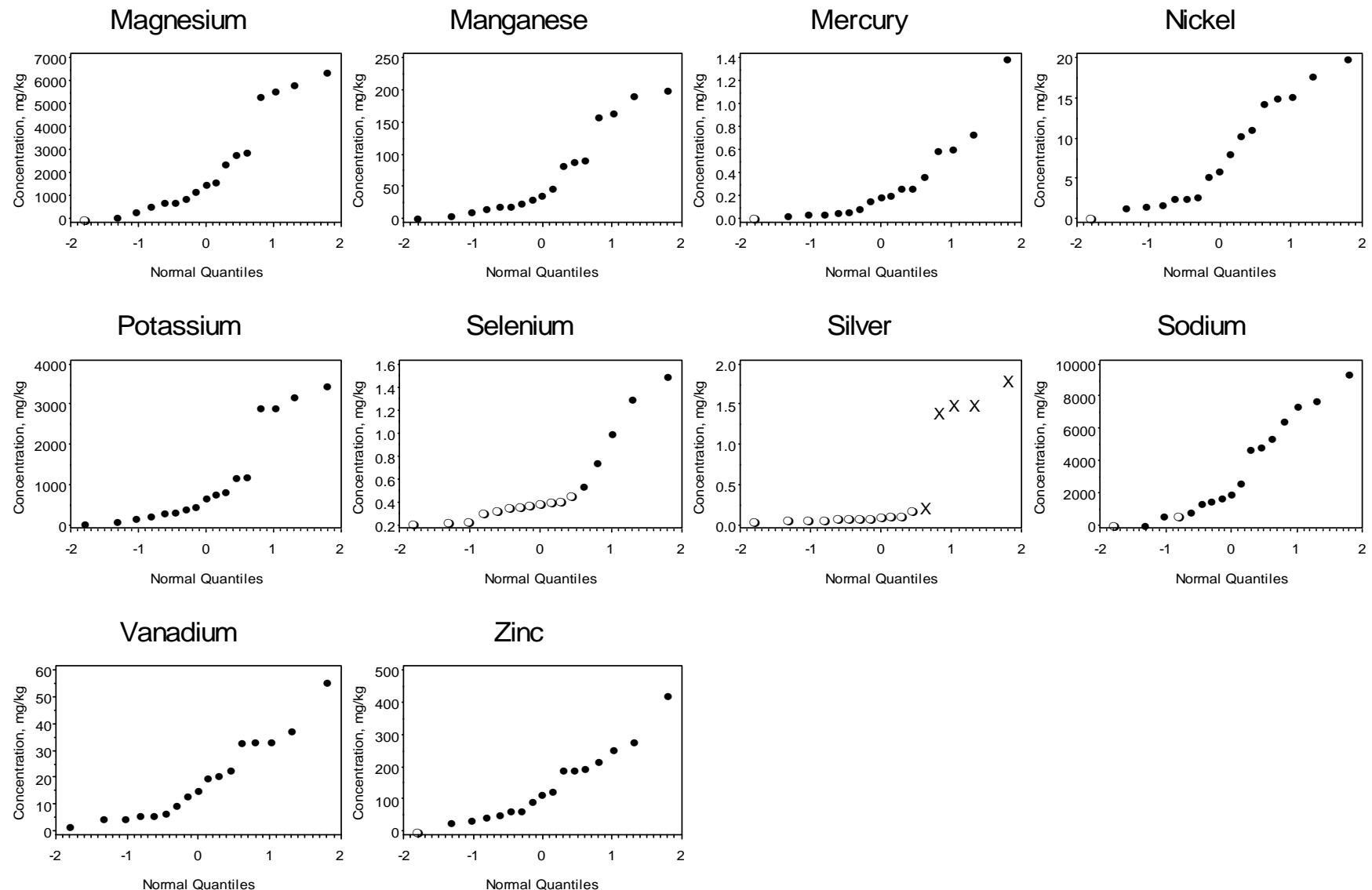
Open Symbol Represents Nondetected Value; Frequency of Detection Provided at Top of Plots
X represents calculated outlier (Xnd for non-detect proxy)

Figure 3: Probability Plots for Detected Inorganics



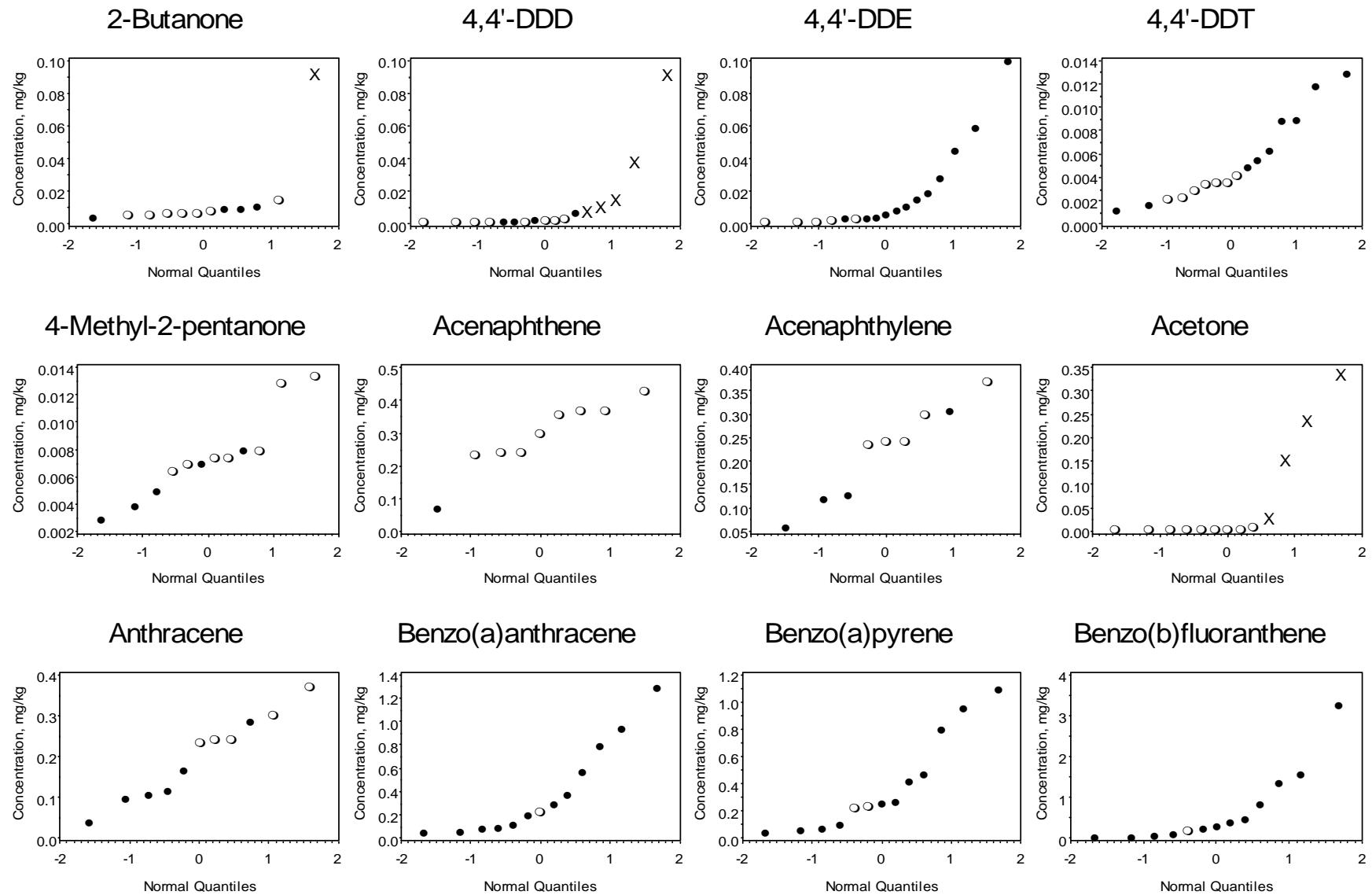
Open Symbol Represents Nondetected Value
X represents calculated outlier (Xnd for non-detect proxy)

Figure 3: Probability Plots for Detected Inorganics



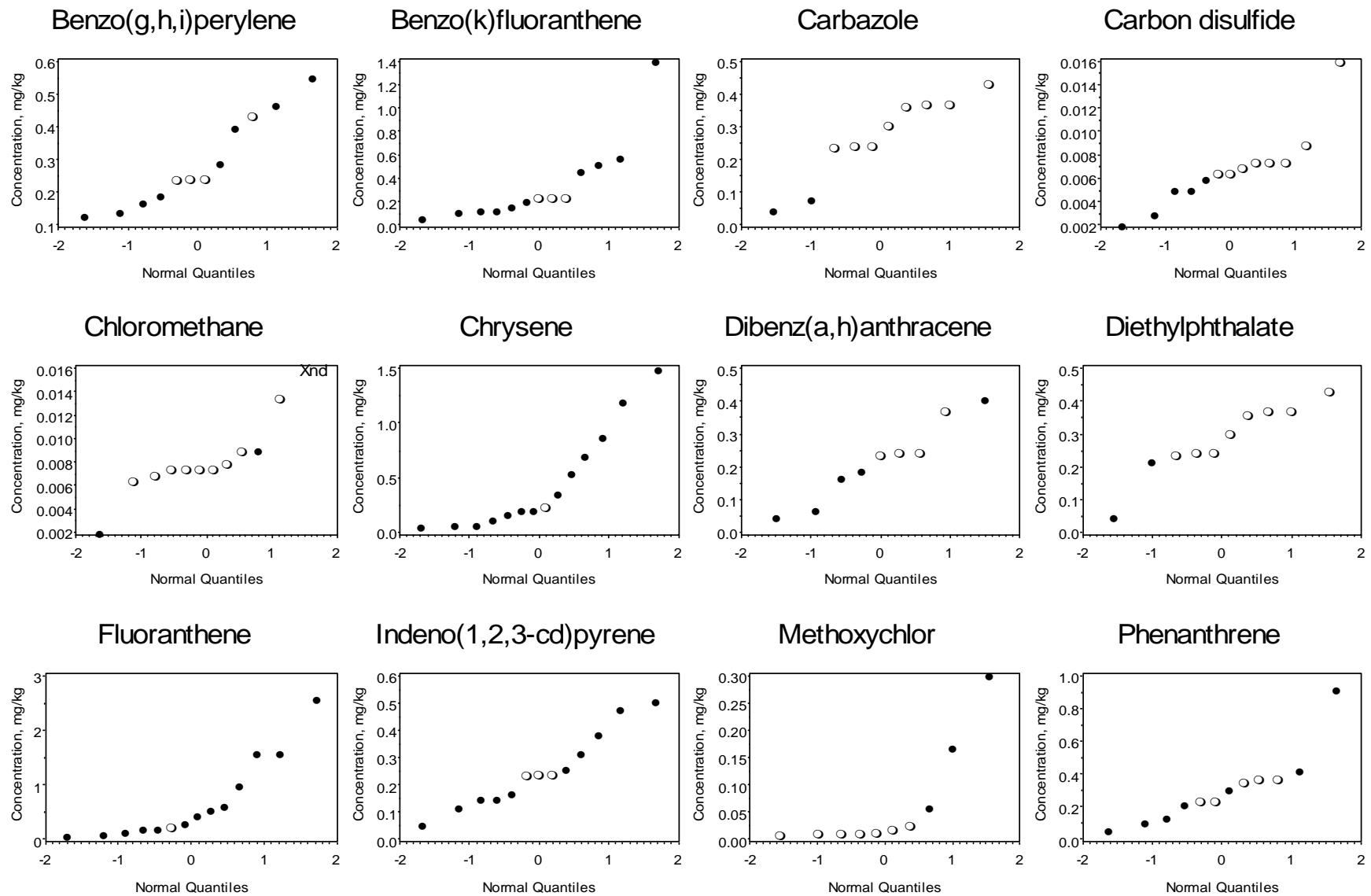
Open Symbol Represents Nondetected Value
 X represents calculated outlier (Xnd for non-detect proxy)

Figure 4: Probability Plots for Detected Organics



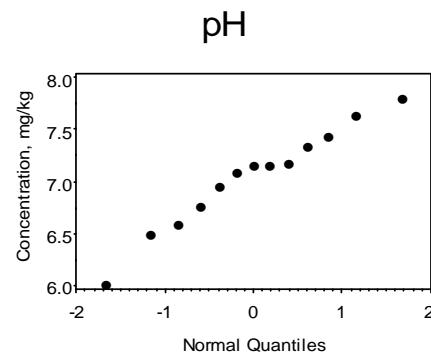
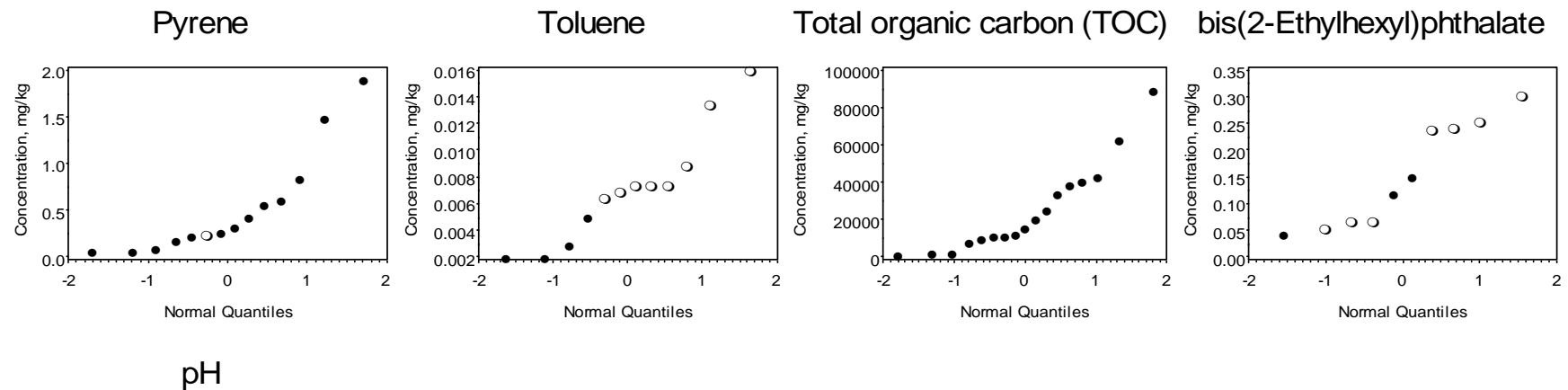
Open Symbol Represents Nondetected Value
 X represents calculated outlier (Xnd for non-detect proxy)

Figure 4: Probability Plots for Detected Organics



Open Symbol Represents Nondetected Value
 X represents calculated outlier (Xnd for non-detect proxy)

Figure 4: Probability Plots for Detected Organics



Open Symbol Represents Nondetected Value
X represents calculated outlier (Xnd for non-detect proxy)

Appendix C

Grain Size Data

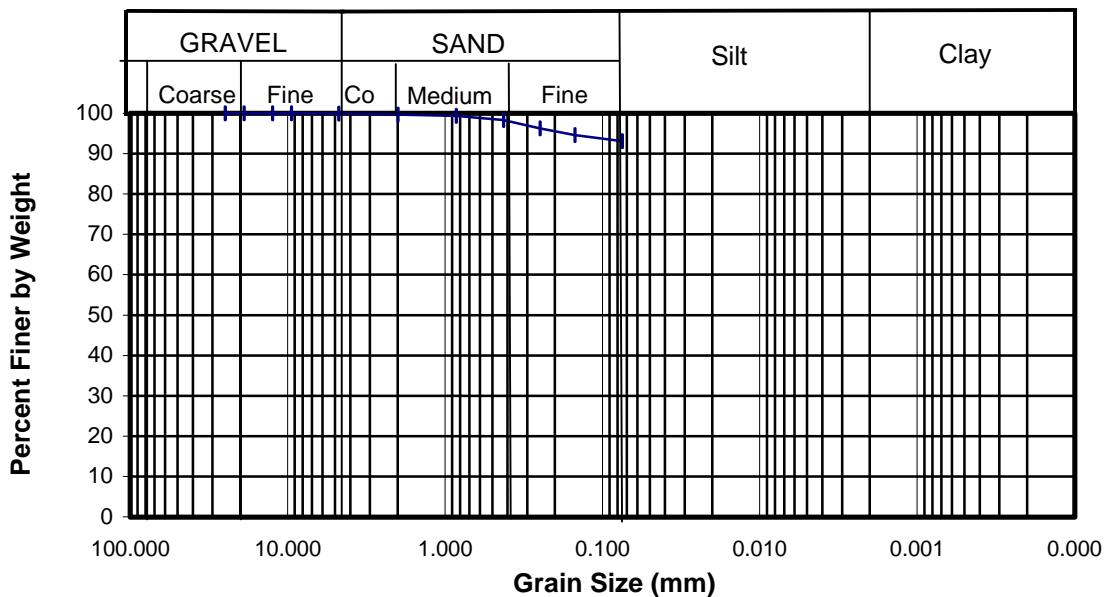
Engineering and Testing Consultants, Inc.

SIEVE ANALYSIS

Project Name: CH2M HILL Laboratory Testing
Project Number: CTO-29
Number: 3167-110
Sample Number: SJREF-SD01-00-04A
Sample Type: Sediment
Sample Description: Silty CLAY (CH), Dark Brown and Gray, Trace Fine Sand, Shell Fragments and Organics
Test Method: ASTM D 422

Sieve Analysis Data

SIEVE NO.	PERCENT PASSING
1 Inch	100.0
3/4 Inch	100.0
3/8 Inch	100.0
4	99.9
10	99.7
20	99.4
40	98.4
60	96.3
100	94.6
200	93.1



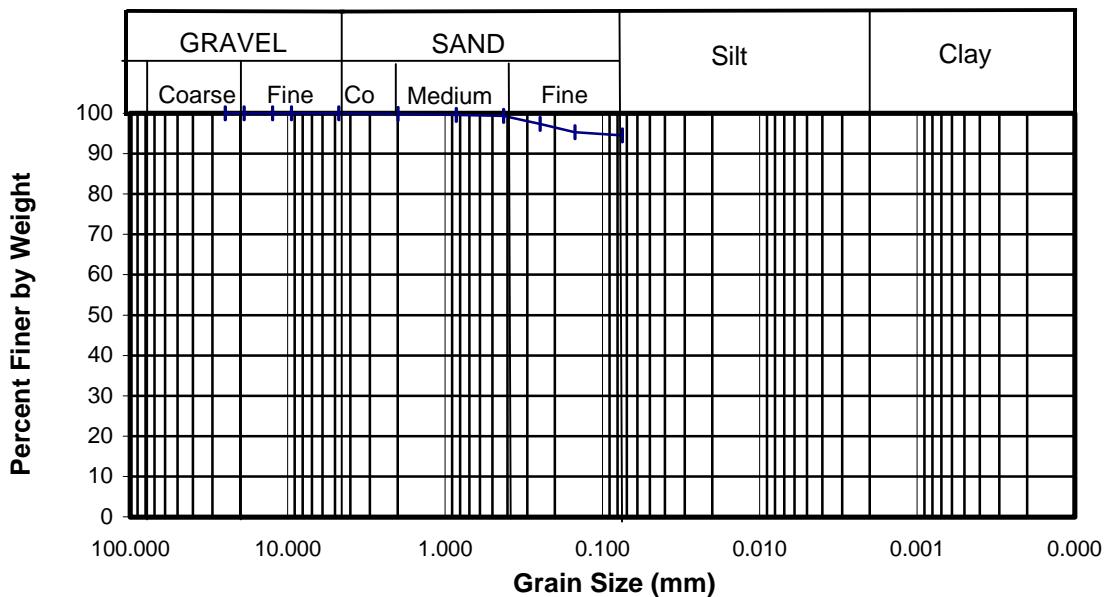
Engineering and Testing Consultants, Inc.

SIEVE ANALYSIS

Project Name: CH2M HILL Laboratory Testing
Project Number: CTO-29
Number: 3167-110
Sample Number: SJREF-SD02-00-04A
Sample Type: Sediment
Sample Description: Silty CLAY (CH), Dark Brown and Gray, Trace Fine Sand and Organics
Test Method: ASTM D 422

Sieve Analysis Data

SIEVE NO.	PERCENT PASSING
1 Inch	100.0
3/4 Inch	100.0
3/8 Inch	100.0
4	100.0
10	99.9
20	99.6
40	99.3
60	97.4
100	95.3
200	94.5



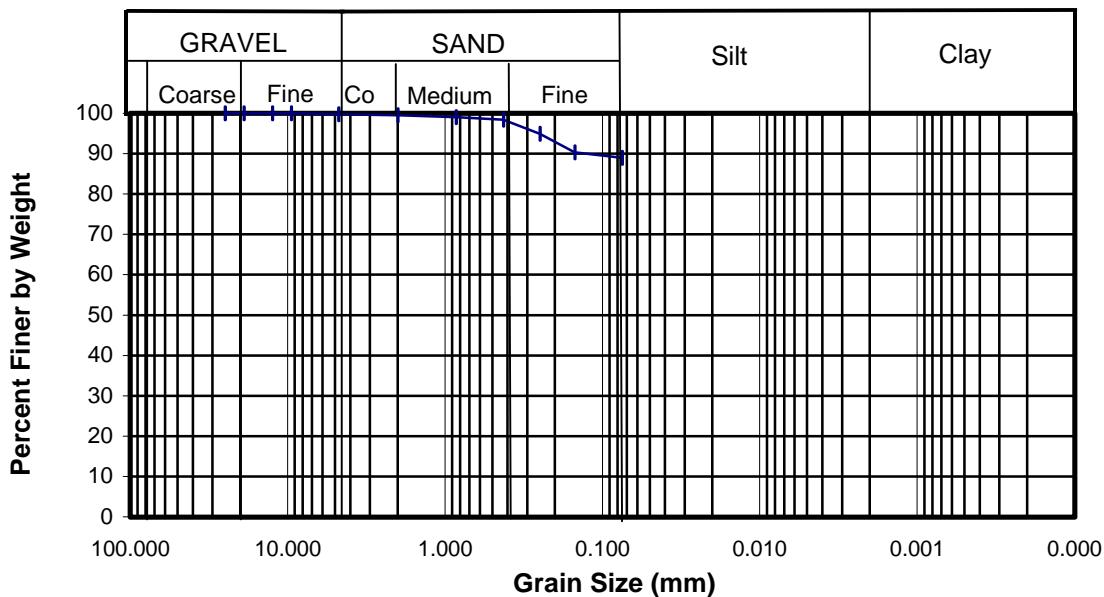
Engineering and Testing Consultants, Inc.

SIEVE ANALYSIS

Project Name: CH2M HILL Laboratory Testing
Project Number: CTO-29
Number: 3167-110
Sample Number: SJREF-SD03-00-04A
Sample Type: Sediment
Sample Description: Silty CLAY (CH), Dark Brown and Gray, Trace Fine Sand and Organics
Test Method: ASTM D 422

Sieve Analysis Data

SIEVE NO.	PERCENT PASSING
1 Inch	100.0
3/4 Inch	100.0
3/8 Inch	100.0
4	99.8
10	99.5
20	99.0
40	98.4
60	94.9
100	90.4
200	89.0



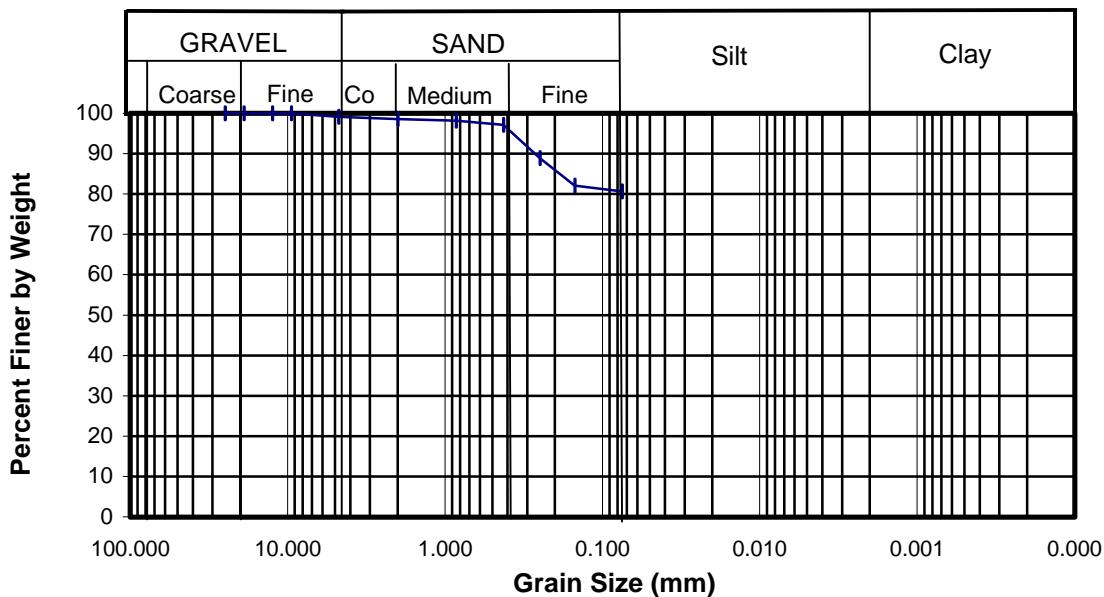
Engineering and Testing Consultants, Inc.

SIEVE ANALYSIS

Project Name: CH2M HILL Laboratory Testing
Project Number: CTO-29
Number: 3167-110
Sample Number: SJREF-SD04-00-04A
Sample Type: Sediment
Sample Description: Silty CLAY (CH), Dark Brown and Gray, with Fine Sand, Shell Fragments and Organics
Test Method: ASTM D 422

Sieve Analysis Data

SIEVE NO.	PERCENT PASSING
1 Inch	100.0
3/4 Inch	100.0
3/8 Inch	100.0
4	99.1
10	98.6
20	98.1
40	97.1
60	88.9
100	82.1
200	80.7



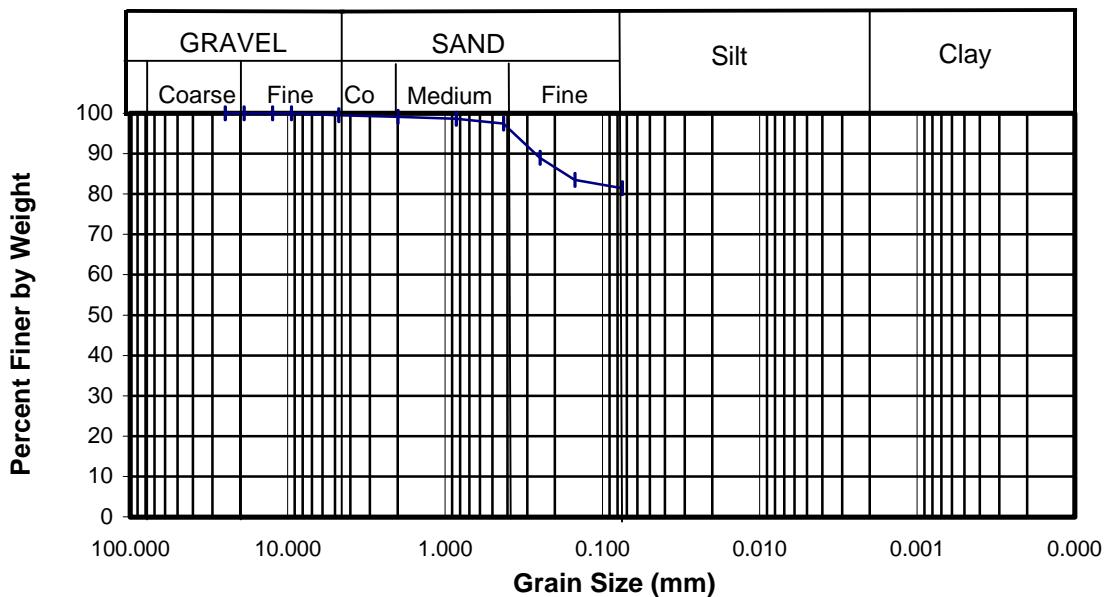
Engineering and Testing Consultants, Inc.

SIEVE ANALYSIS

Project Name: CH2M HILL Laboratory Testing
Project Number: CTO-29
Number: 3167-110
Sample Number: SJREF-SD05-00-04A
Sample Type: Sediment
Sample Description: Silty CLAY (CH), Dark Brown and Gray, with Fine Sand, Shell Fragments and Organics
Test Method: ASTM D 422

Sieve Analysis Data

SIEVE NO.	PERCENT PASSING
1 Inch	100.0
3/4 Inch	100.0
3/8 Inch	100.0
4	99.6
10	99.1
20	98.7
40	97.5
60	88.9
100	83.5
200	81.5



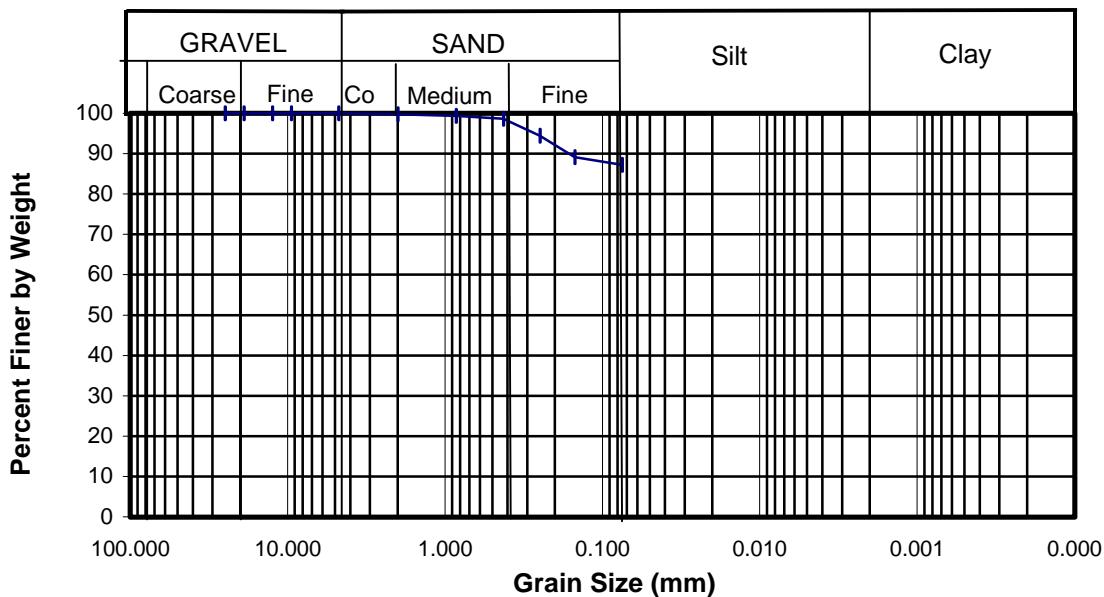
Engineering and Testing Consultants, Inc.

SIEVE ANALYSIS

Project Name: CH2M HILL Laboratory Testing
Project Number: CTO-29
Number: 3167-110
Sample Number: SJSO2-SD15-00-04A
Sample Type: Sediment
Sample Description: Silty CLAY (CH), Dark Brown and Gray, with Fine Sand and Organics
Test Method: ASTM D 422

Sieve Analysis Data

SIEVE NO.	PERCENT PASSING
1 Inch	100.0
3/4 Inch	100.0
3/8 Inch	100.0
4	100.0
10	99.8
20	99.4
40	98.7
60	94.5
100	89.2
200	87.2



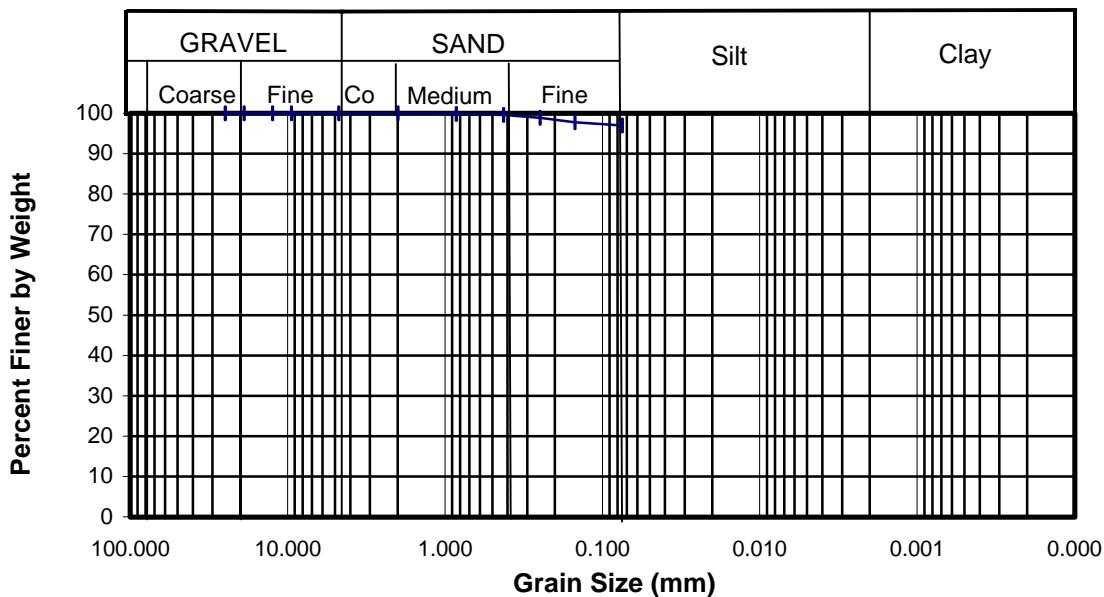
Engineering and Testing Consultants, Inc.

SIEVE ANALYSIS

Project Name: CH2M HILL Laboratory Testing
Project Number: CTO-29
Number: 3167-110
Sample Number: SJSO2-SD16-00-04A
Sample Type: Sediment
Sample Description: Silty CLAY (CH), Dark Brown and Gray, Trace Fine Sand and Organics
Test Method: ASTM D 422

Sieve Analysis Data

SIEVE NO.	PERCENT PASSING
1 Inch	100.0
3/4 Inch	100.0
3/8 Inch	100.0
4	100.0
10	100.0
20	99.8
40	99.6
60	98.9
100	97.8
200	97.0



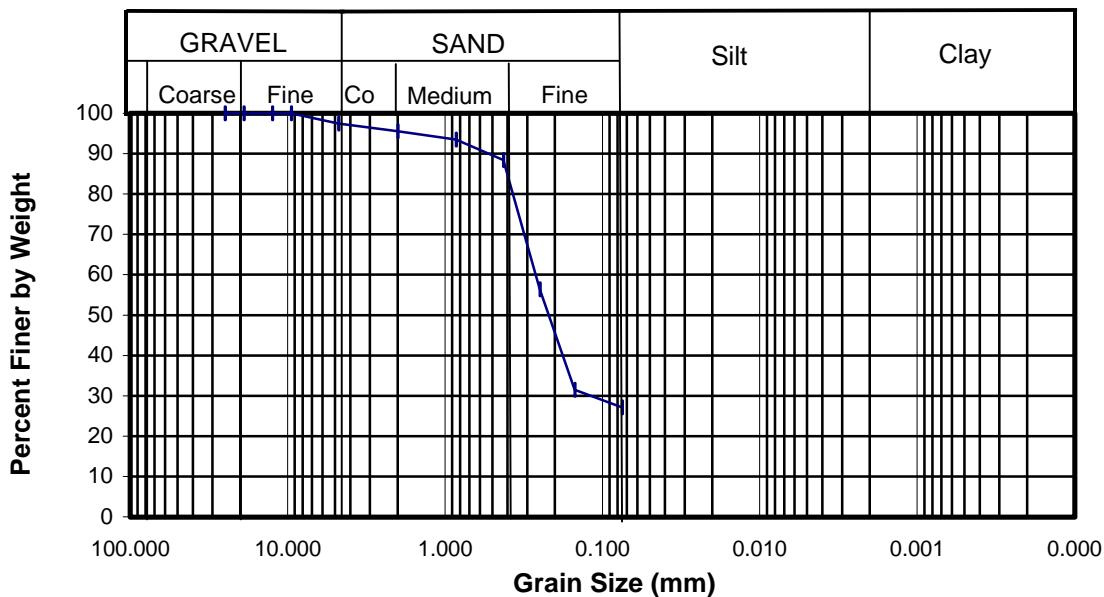
Engineering and Testing Consultants, Inc.

SIEVE ANALYSIS

Project Name: CH2M HILL Laboratory Testing
Project Number: CTO-29
Number: 3167-110
Sample Number: SJSO2-SD17-00-04A
Sample Type: Sediment
Sample Description: Silty SAND (SM), Dark Brown and Gray, Fine to Coarse, Trace Clay,
Trace Fine Gravel, Shell Fragments and Organics
Test Method: ASTM D 422

Sieve Analysis Data

SIEVE NO.	PERCENT PASSING
1 Inch	100.0
3/4 Inch	100.0
3/8 Inch	100.0
4	97.5
10	95.6
20	93.5
40	88.4
60	56.4
100	31.5
200	27.1



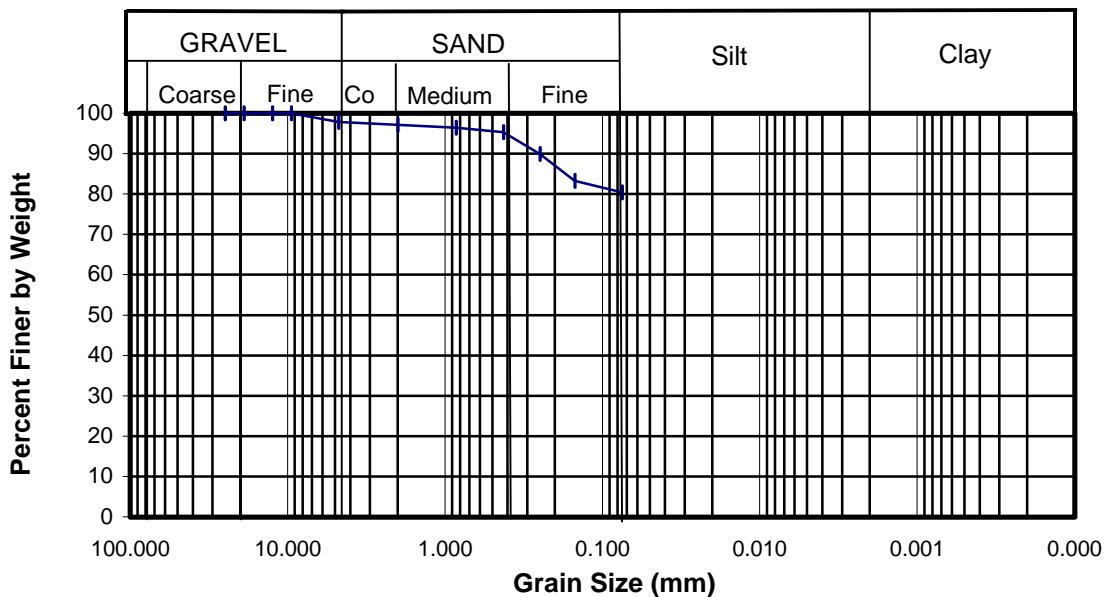
Engineering and Testing Consultants, Inc.

SIEVE ANALYSIS

Project Name: CH2M HILL Laboratory Testing
Project Number: CTO-29
Number: 3167-110
Sample Number: SJSO2-SD18-00-04A
Sample Type: Sediment
Sample Description: Silty CLAY (CH), Dark Brown and Gray, Trace Fine to Coarse Sand,
Trace Fine Gravel, Shell Fragments and Organics
Test Method: ASTM D 422

Sieve Analysis Data

SIEVE NO.	PERCENT PASSING
1 Inch	100.0
3/4 Inch	100.0
3/8 Inch	100.0
4	97.8
10	97.1
20	96.4
40	95.3
60	89.9
100	83.3
200	80.4



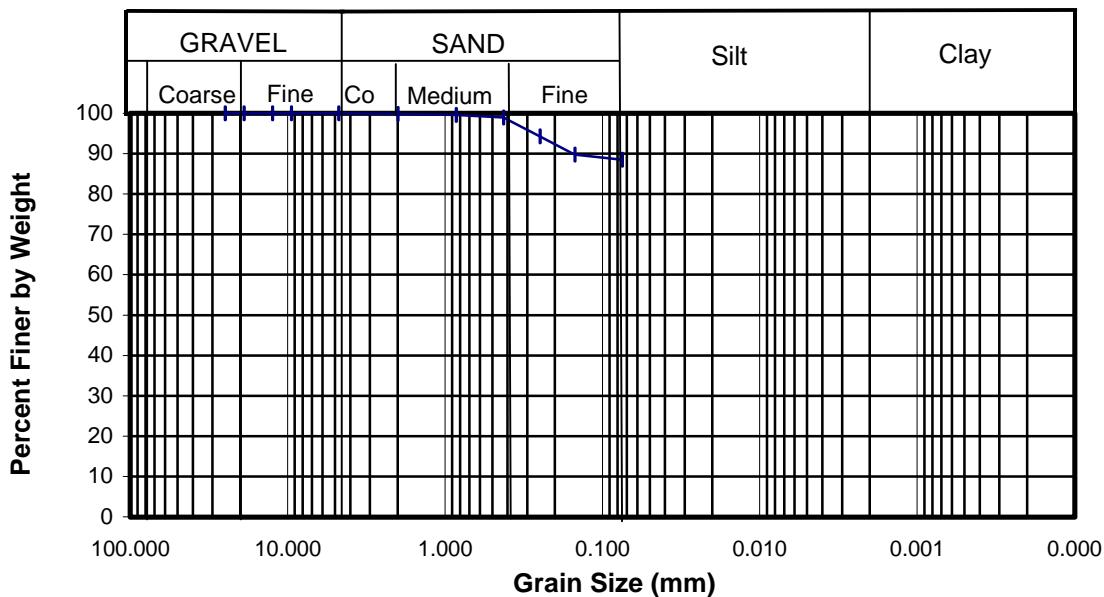
Engineering and Testing Consultants, Inc.

SIEVE ANALYSIS

Project Name: CH2M HILL Laboratory Testing
Project Number: CTO-29
Number: 3167-110
Sample Number: SJSO2-SD19-00-04A
Sample Type: Sediment
Sample Description: Silty CLAY (CH), Dark Brown and Gray, with Fine Sand, Shell Fragments and Organics
Test Method: ASTM D 422

Sieve Analysis Data

SIEVE NO.	PERCENT PASSING
1 Inch	100.0
3/4 Inch	100.0
3/8 Inch	100.0
4	100.0
10	99.9
20	99.6
40	99.0
60	94.3
100	89.8
200	88.5



Engineering and Testing Consultants, Inc.

SIEVE ANALYSIS

Project Name: CH2M HILL Laboratory Testing
Project Number: CTO-29
Number: 3167-110
Sample Number: SJSO2-SD20-00-04A
Sample Type: Sediment
Sample Description: Silty CLAY (CH), Dark Brown and Gray, with Fine to Medium Sand, Trace Shell Fragments, Wood and Organic Fragments
Test Method: ASTM D 422

Sieve Analysis Data

SIEVE NO.	PERCENT PASSING
1 Inch	100.0
3/4 Inch	100.0
3/8 Inch	98.6
4	98.4
10	97.1
20	95.5
40	93.2
60	85.0
100	77.7
200	75.0

